



UNDERSTANDING THE INTANGIBLE

Improving “good” risk governance for water-related extremes by connecting EU policy and multiple case study comparison

Dissertation in submission for the Degree of Dr. rer.pol. by Teresa Sprague, M.Sc.



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**Understanding the Intangible:
Improving “good” risk governance for water-related extremes
by connecting EU policy and multiple case study comparison**

This dissertation is submitted for the degree of Doctor of Political Science (Dr. rer.pol.)
of the Faculty of Spatial Planning of the Technical University of Dortmund

September 2016

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Cover photo source:

author's own photo of Le Riou Bourdoux, a torrent of the Ubaye Valley in Barcelonnette, France (taken July 2013)

Acknowledgements

This research would not have been possible without the assistance and input from a wide range of supervisors, colleagues, and family and friends. This list of acknowledgements attempts to thank at least the majority of those who have enabled this body of research to come to fruition.

First, to my supervisor Prof. Dr. Stefan Greiving, I wish to extend my thanks and great appreciation for this wonderful opportunity and journey, not only in the pursuit of this research but in the many opportunities provided through the Institute of Spatial Planning for additional research and teaching. I will forever be grateful for your guidance and encouragement.

For Prof. Dr. Sabine Baumgart, I thank you for your time and guidance in trying to make this research more manageable without reducing research quality. To Prof. Dr. Karsten Zimmermann, I thank you for your guidance in the policy and political science realm of the thesis. To Prof. Dr. Joern Birkmann, I thank you for your time and input, especially in the beginning of this research.

To my colleagues and friends at the Institute of Spatial Planning (IRPUD), I thank you so very much for your support and friendship throughout this journey. You have been a constant source of positive encouragement for which I am extremely thankful. I also thank the student assistants who provided a tremendous service in the transcription of interviews (Stefan Dierkes) and in the formatting and layout of this thesis (Maurice Buchsein).

Special thanks are also given to those who assisted and created the maps for the catchment areas: Tjark Bornemann (French case and composite view, IRPUD), Dr. Mihai Micu (Romanian case, Institute of Geography, Romanian Academy, Bucharest (IGRAC)), František Imrich (Polish case, Institute of Urban Development, Kraków (IRM)), and Dr. Roxana Ciurean (Italian case, Department of Geography and Regional Research, University of Vienna (UNIVIE)).

Much thanks and appreciation is also extended to Dr. Daniel Müller and to the many members of the Faculty of Spatial Planning as well as my fellow PhD students who have provided inputs in the Doctoral Colloquium. The input from these colloquium sessions has been tremendously helpful in navigating the PhD process and understanding methods.

To my fellow friends and colleagues in the CHANGES project, this has been quite the journey and I am very grateful to have the opportunity to meet, to learn from, and to get to know all of you. To those CHANGES partners and colleagues who provided translation, I am indebted to your help and guidance throughout the difficulties of fieldwork.

In each of the case study sites, a number of individuals provided invaluable help through the fieldwork process. The following lists (arranged by case) the partners and colleagues who made connections to local stakeholders, helped arrange meetings, and in many cases supported transla-

tion of interviews as well as guided field site visits.

From the Romanian case: Dr. Mihai Micu (IGRAC)

From the Polish case: Wiktor Głowaki and Janusz Komenda (and student assistants Aleksandra Kominek, Wojciech Kamiński) (IRM)

From the Italian case: Dr. Simone Frigerio, Dr. Alessandro Pasuto, Jean-Luca Marcato (IRPI, CNR)

From the French case: Dr. Jean-Philippe Malet (Uni Strasbourg), Marie Charrière (formerly TU Delft, now UNIL), (and student assistant Laurine Blard)

A special thanks to CHANGES partners who provided additional guidance:

Dr. Thom Bogaard (TU Delft) – for guidance on overall approach

Dr. Erik Mostert (TU Delft) – for guidance on dealing with legal documents and material

Sandra Junier (TU Delft) – for guidance on assessing qualitative data

Prof. Dr. Thomas Glade (UNIVIE) – for guidance on conceptual framework development

Dr. Dagmar Schröter (formerly IIASA, now ETH Zurich) - for guidance on general approach and navigating being a PhD student

Dr. Anthony Patt (formerly IIASA, now ETH Zurich) – for guidance on the conceptual framework and indicators

Dr. Anna Scolobig (formerly IIASA, now ETH Zurich) – for guidance on the conceptual framework and the Italian case study site and general fieldwork guidance

I would also like to extend a very special thanks to Kathrin Prenger-Berninghoff. We have gone through a very long journey and have overcome many obstacles. I am thankful for your patience and most of all your friendship throughout this (at many times) stressful, fun, and extraordinary experience.

To all of the lovely people I have had the opportunity to meet in conducting the many interviews for this research, I thank each and every one of you for your time and effort in participating in this project.

And last, but most importantly, I thank my family. To my mom for the time and energy spent assisting with editing and finding the odd bits and “nuts” among all the pages. To all my family: you have been with me and supported me and my, at times unreasonable, endeavor from both near and far. I am and have been so very blessed to have your love and support.

All errors and omissions appearing within this work are attributed to the author and the author alone.

Abstract

The changing intensity and frequency of hydro-meteorological (interpreted roughly as “water-related”) hazards and the risk of extreme hazardous events is highly variable, riddled with uncertainty, and requires flexibility in the updating and revision of risk assessment and management strategies. These strategies must overcome challenges posed by a changing environment, and require a place-based approach for establishing an understanding of the local context for disaster risk reduction (DRR) and in trying to develop tailor-made strategies for a local, spatial context. This is particularly relevant given that how risks are handled and defined strongly depends upon this context, which is determined through physical characteristics as well as socio and cultural values. The basic premise for research presented in this dissertation is that DRR is achieved through minimizing risk governance deficits, encouraging good governance practices, and taking a place-based approach to better understand contextual factors and to be able to consequentially respond to the challenges posed by changing environments. Under this premise, a conceptual framework and an analysis tool were created to develop an understanding of “good” risk governance and how this can be operationalized and analyzed within different spatial contexts. The tool itself is based on an extensive policy analysis conducted using MAXQDA qualitative data analysis software to code and derive a category and indicator set for “good” risk governance at the EU level. This level, was chosen as a common denominator for the analysis of on-the-ground practices and connects conceptual, policy, and in-practice understandings of “good” risk governance through its use in the analysis and comparison of over 100 qualitative interviews completed in four case study sites.

The four cases, represented by catchment based delineations, are divided into two main cases (represented by the Barcelonnette catchment in Alpes des Haute Provence, France and Nehoiu catchment in Buzău County, Romania) and two satellite case (represented by the Fella River catchment in Friuli-Venezia-Giulia region, Italy and the Wieprzówka catchment in Małopolska, Poland). Main cases were chosen and results presented individually to demonstrate the depth of the use of the analysis tool; while the satellite in combination with the main cases were used to demonstrate the cross-case comparative potential and to amass findings through a multi-case breadth. Results reflect upon the analysis tool itself and the understanding of how different and often intangible principles of “good” risk governance can be interpreted and connected to in-practice strategies. The research concludes with recommendations for both the cases and, for the issues found in common across cases, at the EU level for future policy development in advancing the understanding and connection of risk governance to in-practice strategies and issues for local spatial contexts.

Keywords: good governance, risk governance, policy analysis, multiple case study, water-related extremes, spatial context

Source of funding: This research was funded by the European Community’s 7th Framework Programme FP7/2007/2013 in the Marie Skłodowska-Curie ITN project “CHANGES” (Changing Hydro-meteorological Risks as Analyzed by a New Generation of European Scientists, Grant Agreement No. 263953).

“[A] man who neglects what is actually done for what should be done learns the way to self-destruction.”

Niccolò Machiavelli, *The Prince* (Harmondsworth: Penguin, 1984, 91)

“With the problems and risks of our time - environmental, social, demographic; globally and locally - Machiavelli’s dictum remains acutely relevant today. Whereas the focus of modernity is on ‘what should be done,’ I suggest a reorientation toward ‘what is actually done.’ In this way we obtain a better grasp - less idealistic, more grounded - of what modernity and modern democracy are and what kind of strategies and tactics may help change them for the better.”

Bent Flyvbjerg 1998, 2-3 (referring to previous quote)

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List of abbreviations

ADBVE	Water Basin Authority of the Isonzo, Tagliamento, Livenza, Piave, and Brenta- Bacchiglione
ADSR	Annual Disaster Statistical Review
AESOP	Association of European Schools of Planning
AFPCN	French Association for the Prevention of Natural Catastrophes
AMF	Association of the Mayors of France and the Intercommunal Presidents (Association des Maires de France et des Présidents d’Intercommunalité)
APAT	Agency for Environmental Protection and Technical Services
ASTRA	ASTRA Insurance
BIOA	British and Irish Ombudsman Association
BLOM	planning consultancy company (Bucharest Offices, Romania)
BRGM	Office of Geologic and Mining Research (Bureau des Recherches Géologiques et Minières)
CC	Communities of Communes
CCA	Climate Change Adaptation
CCR	Central Reinsurance Agency (Caisse Centrale de reassurance)
CCVU	Community of Communes of the Ubaye Valley (Communauté de Communes Vallées de l’Ubaye)
CEC	Commission of the European Communities
CHANGES	Changing Hydro-meteorological Risks as Analyzed by a New Generation of European Scientists
CIPTM	(Carte Informative des Phénomènes Torrentiels et Mouvements de Terrain)
CNR	National Research Institute (Consiglio Nazionale delle Ricerche)
CODIS	Fire and Emergency Operations Centre (Centre Opérationnel d’Incendie et de Secours)
COGIC	Interministerial Crisis Management Operations Centre (Centre Opérationnel de Gestion Interministérielle de Crise)
COM	Communication (European Union policy document)
COPRNM	Council Direction for the Prevention of Major Natural Risks (Conseil d’Orientation pour la Prévention des Risques naturels Majeurs)
COS	Emergency Operations Control (Commandement des Opérations de Secours)
COZ	Operational Co-ordination Centre
CRIGE	The Regional Center for Geographic Information
CRS	(Compagnies Républicaines de Sécurité)

DDR	Disaster Risk Reduction
DDRM	(Dossier Départemental des Risques Majeurs)
DDT	(Direction Départementale des Territoires)
DGPR	General Directorate of Prevention of Risks (Direction Générale de la Prévention des Risques)
DICRIM	Communal Informative Document on Major Risks (Document d'Information Communal sur les Risques Majeurs)
DREAL	Regional Direction of the Environment, Development, and Housing (Regional units of the French Ministry of Ecology)
DRM	Disaster Risk Management
DRR	Disaster Risk Reduction
DSC	Directorate of Civil Defense and Security
DSS	Decision Support System
EC	European Commission
EEA	European Environment Agency
EOS	European Organization for Security
EPA	Environmental Protection Agency
EPC	Private Environmental Consultancy
ESPON	European Spatial Planning Observation Network
ESR	Early Stage Researcher
EU	European Union
EWS	Early Warning System
FP7	Seventh Framework Programme
FR	France
FVG	Friuli-Venezia Giulia
GALA	name of EWS system in France case study
GLOF	glacial lake outburst flood
HFA	Hyogo Framework for Action
IGRAC	Institute of Geography of the Romanian Academy
IGSU	General Inspectorate for Emergency Situations
INSEE	(Institut national de la statistique et des études économiques)
IPCC	Intergovernmental Panel on Climate Change
IRGC	International Risk Governance Council
ISIG	International Institute of Sociology of Gorizia (Istituto di Sociologia Internazionale di Gorizia)
ISDR	International Strategy for Disaster Reduction
ISTAT	National Institute of Statistics (Istituto Nazionale di Statistica)
ISU	Emergency Situation Inspectorate
IT	Italy

MEDDTL	Ministry of Ecology, Sustainable Development, Transport and Housing (Ministre de l'Écologie, du Développement durable, des Transports et du Logement)
MIDIR	Multidimensional Integrated Risk Governance (EU project)
NGO	Non-governmental organization
NRC	National Research Council of the National Academies
ONF	National Forestry Agency (Office National des Forêts)
ORSEC	Organization for Civil Security Response (Organisation de la Réponse de Sécurité Civile)
PACA	Provence-Alpes-Côte d'Azur
PADD	(Plan d'Amenagement et Developpement Durable)
PAI	(Piano stralcio di assetto idrogeologico)
PAID	(Pool-ul de Asigurare Impotriva Dezastretor Naturale S.A.)
PARN	Pôle Alpin d'Etudes et de Recherche pour la Prévention des Risques Naturels
PATG	Country Level Management Plan
PCS	Municipality Safeguard Plans (Plan Communal de Sauvegarde)
PCO	Post de Command Opérationelle
PGHM	Mountain specialized units of military officers (Peloton Gendarmerie de Haute Montagne)
POS	Land Use Plan (Plan D'Occupation des Sols)
PPI	(Le Plan Particulier d'Intervention)
PPRN	Natural Risk Prevention Plan (Plan de Prévention des Risques Naturels)
PL	Poland
PLU	Local Urbanism Plan (Plan Local d'Urbanisme)
PLUi	Intercommunal Urbanism Plan (Plan Local d'Urbanisme intercommunal)
PRV	Triage Assembly Point (Point de Regroupement des Victimes)
PUG	General Urbanistic Plan
RISKGOV	Comparative Analysis of Risk Governance for Radiological and Chemical Discharges of Industrial Installations (European Commission project)
RO	Romania
ROSA	Romanian Space Agency (Agenția Spațială Română)
RQ	Research Question
RTM	Mountain Terrain Restoration Services (Service de Restauration des Terrains en Montagne)
RZGQ	Regional Water Basin Authority of Krakow (Regionalny Zarząd Gospodarki Wodnej w Krakowie)

SDACR	Departmental Risk Analysis and Cover Scheme (Schéma Départemental d'Analyse et de Couverture des Risques)
SDAGE	Schéma Directeur d'Aménagement et de Gestion des Eaux
SCoT	Territorial Coherence Plan (Schéma de Cohérence Territoriale)
SDIS	Civil Fire Brigades Centre
UN	United Nations
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UN/ISDR	United Nations International Strategy for Disaster Reduction
USGS	United States Geological Survey
WB	World Bank
WCDR	World Conference on Disaster Reduction

Chapter 1

Introduction: understanding the research pursuit

The climate is and will continue to change in the near and distant future with respect to the intensity and frequency of hydro-meteorological events and the consequential potential for extreme hazards and the risks they pose to the natural and built environment (IPCC 2012c). Consequently, decisions are and will continue to be made amidst a background of changing natural and human elements and often with uncertain and incomplete information. Given this setting, it is important to consider what can be done to improve the ability of decision-makers and affected populations to reduce the risks they face in this changing environment. Under the coordination of the United Nations Office for Disaster Reduction, the Hyogo Framework for Action 2005-2015 (HFA) lists governance, and particularly “good” governance, as critical for enhancing resilience and in working toward improvement in efforts to reduce disaster risks. This has also been reiterated in the successor instrument to the HFA, the Sendai Framework for Disaster Risk Reduction 2015-2030 (Sendai Framework), which stresses the need “to continue strengthening good governance in disaster risk reduction strategies at the national, regional and global levels” (UN 2015b, p 10). This has been a starting point to the basic premise for the research, which is that **disaster risk reduction (DRR) is achieved through minimizing risk governance deficits, encouraging good governance practices, and taking a place-based approach to better understand contextual factors and to be able to consequentially respond to the challenges posed by changing environments**. Using this understanding, this chapter provides a basic introduction into the purpose of the research pursuit (Section 1.1), what the research attempts to achieve (Section 1.2), and the overall approach and structure of the study (Section 1.3).

1.1 Purpose of research

The above brief topic introduction gives direction toward how to approach a more in-depth understanding of risk governance and aspects of good governance, the problems this can address for disaster risk reduction, and how this might be gone about through scientific analysis. In the initial considerations for the purpose and selection of methods to investigate these topics through scientific analysis, the research presented in this dissertation was guided by the following questions:

- How do we understand risk governance and what it means in getting from theoretical to practical application? More specifically, what is this and how is it used? How do we connect this to real world practices?
- What problems can risk governance and aspects of good governance try to address?
- For the problems identified, how can risk governance be used as a lens through which solutions can be found?

The first question initiates the need to understand first what risk governance means as a concept and its connection to broader theories as well as its connection to in-practice strategies. The second question transitions from this understanding to the purpose and benefits of using a risk governance approach and more specifically what are the issues that can be addressed in taking this approach. This hints to the literature and work of the International Risk Governance Council (IRGC) and their concept of risk governance deficits as well as to literature on good governance, stressing both the common issues found in governance practice (risk governance deficits) and guidance on how this might be strengthened (good governance).¹ The third question makes the connection to how one might operationalize risk governance as a concept in order to find solutions to these problems. This line of inquiry has guided the purpose of the research and its attempts to address the need for improving policy and policy outcome for reducing disaster risks. Through this operationalization, the research tries to provide a means for practical application by connecting policy with in-practice strategies. This is seen as an essential aspect and motivation for the pursuit of this research as policy is often ill informed and can be improved with practical relevance via empirical input. The research attempts to provide an evidence base for better informed policy using local level practical examples through highly qualitative case study field research as well as higher level policy analysis. The results gleaned from which attempt to reveal overarching patterns as well as what is unique to a given case study site. This investigation is also supported by the personal motivation of the researcher as she has maintained a long standing interest in water-related issues

¹ It should be noted that “good” governance is here initially understood within a western context. However, this is only to note the origin of the term. This does not imply that the term cannot be applied within a non-western context.

and particularly extremes as well as climate change, and in understanding social organization in different cultural contexts. This is combined with a background in policy analysis and political and social sciences. It follows naturally that the use of multiple cases (or one might say places) facing water related extreme events to understand the phenomena of risk governance and “good” governance would be an ideal selection for the research pursuit.

This investigation and content of the presented thesis was conducted within the Marie Skłodowska-Curie ITN project “CHANGES” (Changing Hydro-meteorological Risks as Analyzed by a New Generation of European Scientists, Grant Agreement No. 263953), funded by the European Community’s 7th Framework Programme FP7/2007/2013. The research makes use of the four case study sites of the CHANGES project, investigating aspects of “good” risk governance, and developing and implementing the approach described in the following chapter sections.

1.2 What the research attempts to achieve (and what it does not)

Focus and scope of analysis

The scope of the topic at hand is tremendously broad and requires a preliminary note on what the thesis that addresses this topic promises, and what it does not promise. This research presented discusses and uses a traditional approach in understanding social context as based on actors, regulatory frameworks, and culture (see **Chapters 3 and 4** for background literature and conceptual framework for more detailed explanation). However, the research does not attempt to provide a full legal analysis of all components of the regulatory frameworks of each of the four case study sites. Nor does this research attempt to map out all connections and interactions between actor networks at all vertical and horizontal dimensions. The research also by no means attempts to provide a holistic analysis of the “risk culture” of each of the four cases. These components (actors, regulatory frameworks, and culture) are identified and considered in the research as crucial inputs into risk governance processes and are planned to be evaluated in greater detail in further research. For the purpose of the research presented, these components are introduced and communicated in a way as to provide the reader with an understanding of the case study descriptions. The information of these components is therefore descriptive in nature and provides background support for the exploratory part of the research, which delves into the concept of risk governance and what is “good” risk governance and how this can be used to improve policy for disaster risk reduction.

That said, what this research does promise is an exploratory analysis of risk governance from a policy development perspective with substantial empirical input from in-practice strategies. This is attempted through the development of a conceptual framework, an EU level policy analysis, and support of an extensive empirical evidence base at the local and regional levels of the four case study sites. The analysis concludes with reflections and recommendations supporting the main aim of the research, as elaborated below.

Aim and objectives

The **aim** of this research is to provide reflections and recommendations for strategies and practices that are commonly applicable as well as those elements that have to be tailor-made for the local context of each case study analyzed. The purpose of this aim is two-fold. This aim attempts to assist efforts of policy makers and local decision makers to reduce disaster risk by providing the knowledge gleaned from case study analysis. It provides examples and comparison across cases of what are common practices, what works well, and where key points for improvement need remedy. The aim also furthers the scientific dialogue of how risk governance as a concept is connected to in-practice strategies, their policy development, and implementation. To pursue this aim, a series of **four objectives** were developed and provided a guidance for the structure of the research (see Figure 1.1).

1. **Characterization of what is “good” risk governance;**
2. **Establishment of what is the spatial context in which risk governance processes occur within each case study area *through both desk study research and field-work*;**
3. **Operationalization of risk governance *through use of an indicator system* to establish the basis of analyzing the empirical work in each study area;**
4. **Reflection and recommendations for future policy development at EU and case study levels.**

Figure 1.1: Research Objectives

These objectives, and indeed the main aim of the research itself, are supported by a series of five **research questions**. These research questions are organized according to specific headings (see Figure 1.2). The headings are a product of the initial literature review and consequential guiding perspectives. They attempt to emphasize some of the key concepts found within a given spatial context for each of the case study sites. The questions provided attempt to embody different elements of what sets the foundation of societal inputs for risk governance strategies. These components of the research (aim, objectives, and research questions) and how they are addressed through the course of the research are explained in greater detail in the next chapter (**Chapter 2 Pursuing a**

highly qualitative approach), which provides the methodological underpinnings and the selection of chosen methods.

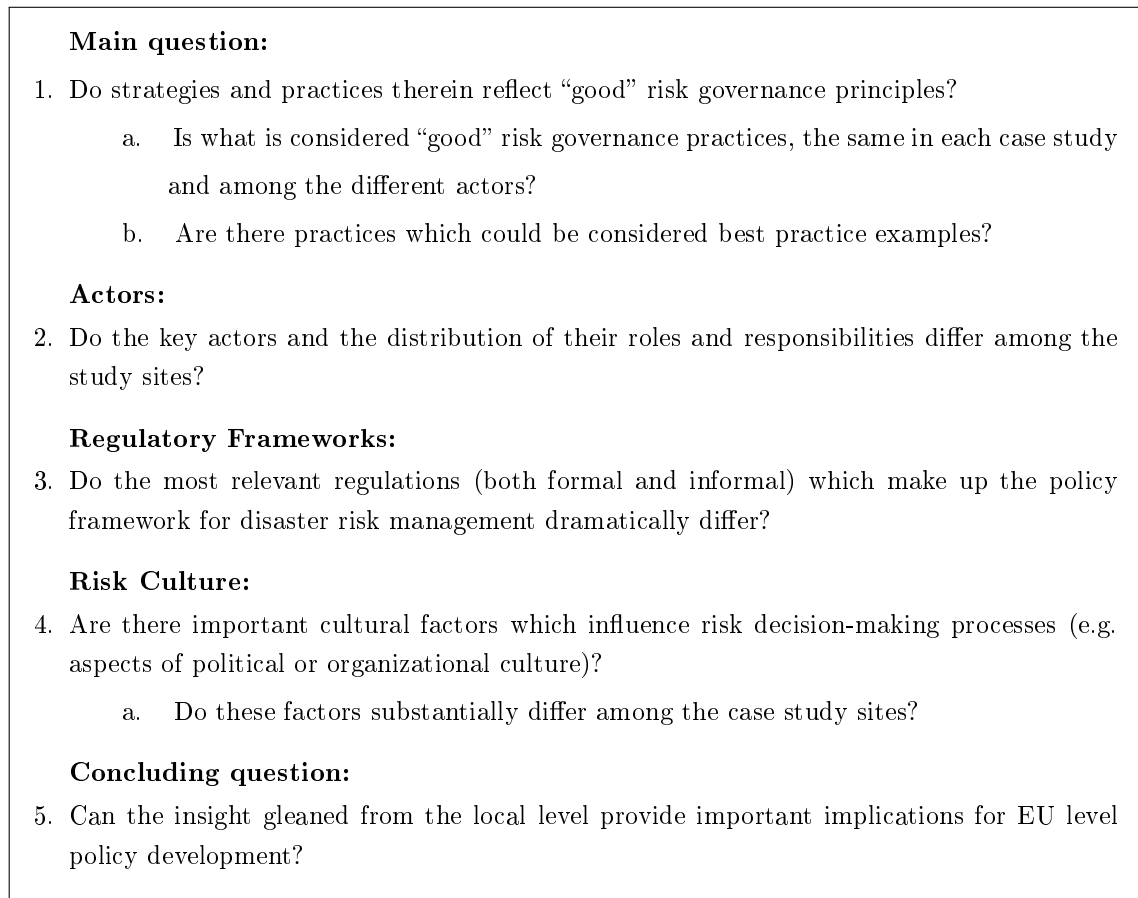


Figure 1.2: Research Questions

In addressing the above components of the research, this investigation attempts to hold relevance for and make contributions to both policy and science. With respect to scientific significance and innovation, the research design provides an idea for how to understand, operationalize, and integrate practice and policy into “good” risk governance and how this might be addressed within future scientific research. Use of deductive reasoning within the research design considers departures from present relevant concepts and contributes to the topical discourse through reflection enabled by case study evidence and analysis thereof. In terms of policy-relevant significance and innovation the approach maintains direct significance to EU-level policy, particularly in consideration of the current efforts toward establishing a Community approach to Disaster Risk Reduction and creation of a “common voice” in this respect. This is especially pertinent when considering the effort within the CHANGES project to include both Western and Eastern European case study sites.

Additionally, the research may yield significant implications for practitioners within the fields of risk assessment, risk management and risk communication. This is of particular importance for those whom are interviewed and those who have been involved in the dissemination efforts conducted by the researcher at multiple points during running time of the project.² The benefit of these implications has also been enhanced given that the dissemination of results during these dissemination activities involved multiple practitioner groups. Additional dissemination after the completion of the dissertation submission could provide additional benefit.

1.3 Approach & structure of study

Theoretical assumptions & Methods guiding background literature

The background literature presented in Chapter 3 is guided by several assumptions. These assumptions are a product of the relevant existing perspectives within the topic of risk governance and the achievement of disaster risk reduction. To determine the contents of the background literature chapter, the assumptions were followed with attention paid to defining important concepts and previous frameworks, and communicating their application and support of the research endeavored within this thesis. In addition to this, the conceptual framework presented in Chapter 4 was developed to better understand the connections between the approaches presented and their respective concepts. These assumptions are the product of a preliminary review of the literature surrounding the topic of risk governance and reflect the following main perspectives:

Table 1.1: Assumptions and general perspectives guiding research approach

Changes: strategies must overcome challenges posed by a changing environment
<ul style="list-style-type: none"> • In addition to socio-economic changes, hazards and the risk of hydro-meteorological hazardous events are changing in intensity and frequency of occurrence, and extent of change is uncertain (IPCC 2012c) • There is a need for flexibility, update and revision of risk assessment and management strategies (EU Floods Directive)(Official Journal of the European Communities 2007)
Spatial perspective: It is necessary to take a place-based approach

² More detail as to the interview process is stated within **Chapter 5 Preliminary fieldwork and analysis** and **Chapter 6 Primary fieldwork**.

Table 1.1: (continued)

<ul style="list-style-type: none"> • This is needed for establishing an understanding of the local context for DRR (Mercer 2012; Mercer et al. 2012) • It is further needed in trying to develop tailor-made strategies for a given spatial unit of analysis (Cutter 1996; Cutter and Finch 2008) • How risks are handled and defined strongly depends upon the local, spatial context which is determined through physical characteristics as well as socio and cultural values and the local political system (Kasperson et al. 1988; Slovic 1999; Felt et al. 2007)
<p>Risk governance perspective: Taking a risk governance approach is essential in efforts to reduce disaster risks</p>
<ul style="list-style-type: none"> • The essential processes within risk governance are risk assessment, risk management, and risk communication (IRGC 2006) • Risk governance is region specific and depends on context comprised of case-specific value choices, socio-political systems, and decision structures (Assmuth et al. 2010)
<p>“Good” governance perspective: “Good” governance principles are an important part of risk governance</p>
<ul style="list-style-type: none"> • Utilizing “good” governance is necessary requirement in achieving effective risk governance strategies and therefore must be included in efforts toward reduction of disaster risks (UNISDR 2005; UN 2015b; IRGC 2006; Galperin and Wilkinson 2015) • “good” governance principles have been reiterated to include the following: accountability, transparency, participation, coherence, effectiveness, sustainability, equity, acceptability (TRUSTNET 1999; UNCSD DSD 1996; IRGC 2006; CEC 2001; Weiss 2000)
<p>Risk governance deficits perspective: The different components of the risk governance process are enhanced through the minimization of risk governance deficits (IRGC 2009)</p>

The table provides a glimpse into these main perspectives and their key messages. Greater elaboration of these perspectives is provided in **Chapter 3 Background literature**.

Methods pursued and why

The above perspectives accepted as a set of core assumptions for the research approach encourage the use of particular methods. Achieving disaster risk reduction, according to the theoretical baseline, requires increasing good governance practices while minimizing risk governance deficits. These two components are mutually reinforcing and occur within a given spatial context (see Figure 1.3). This focus on governance within a spatial context

draws emphasis on the socio-cultural aspects and, thus, requires a strong use of qualitative tools and methods as much of the information gleaned with respect to this emphasis is qualitative in nature. A focus on place also supports the benefits and purpose of taking a case study approach. The case study approach is chosen in order to enable comparison of how the theoretical concepts apply in practice to different legal-administrative and cultural contexts. Furthermore, the point stressed on differences of place encourage an interest in pursuing a comparative approach with multiple cases to determine the extent of these differences and possibilities for what characteristics of risk governance strategies employed are held in common and which diverge. Due to the qualitative and complex nature of the comparison, the perspectives support the use of an exploratory case study analysis.

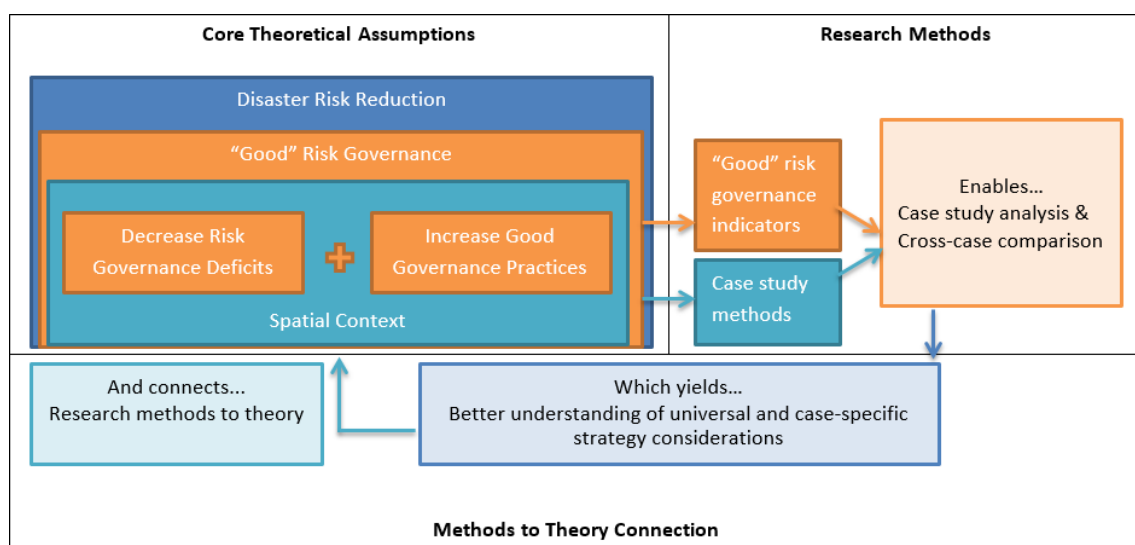


Figure 1.3: Connections between core theoretical assumptions and research methods. **Orange** is related to “good” risk governance. **Light Blue** is specific to the place-based approach, and **Dark Blue** is related to broader theory and connections thereto.

The analysis highlighted in the “Research Methods” section of Figure 1.3 is comprised of the use of a category and indicator system for “good” risk governance and the use of the case study approach. This enables an operationalization of a highly qualitative theme (“good” risk governance) and permits an analysis of both individual case characteristics as well as a cross-case comparison.

Deductive and inductive reasoning

In connecting to theory, the methods employed use both deductive and inductive logic. They are deductive in that assumed theoretical concepts such as “good” governance principles are taken and applied to understand their finer parts. However, they are also inductive in that empirical evidence from on the ground case study practices is utilized to determine if these general concepts should be altered or differently developed with respect to their

application in-practice and within efforts toward disaster risk reduction. Particularly the inductive part of the approach taken is highlighted through this central feature of the research, which requires an empirical evidence base to build upon, alter, and test theoretical concepts. The empirical evidence is provided from the use of the case study approach, using observation and semi-structured interviews as the primary data collection tool. This multi-case study approach greatly strengthens the evidence base for both the applied inductive and deductive logic. It strengthens the inductive through providing a wider, more diverse pool of evidence from different spatial contexts with which to determine patterns applicable to further conceptual development. It strengthens the deductive in that it allows for a comparison of the different parts of the theoretical concepts considered within these different contexts and provides greater implication for how these concepts can be broken down and understood within a variety of different contexts.

Considering the core assumptions, the research methods, and the connection from method to theory supports the elaboration and explanation of the research approach in greater detail presented in Chapter 2, and allows for the development of the structure of the background literature provided in Chapter 3.

Case study selection and limitations

This case study areas investigated and compared by this research are comprised of four catchment areas within the European Union. These are as follows: the Barcelonnette catchment in the Alpes-de-Haut Provence, France; the Fella River catchment in Friuli-Venezia Giulia region, Italy; Wieprzówka catchment in Małopolska, Poland; and Nehoiu catchment in Buzău County, Romania.

These case studies were pre-selected within the “CHANGES” project and were selected based on convenience sampling as well as a number of criteria. The convenience sampling is a result of the network of consortium partners and their current and past access to particular case study sites, stakeholders, and data. Though these cases were initial chosen based on this convenience sampling, all selected cases do maintain specific common criteria. The first criterion was the anticipated experience with future climatic impacts. All cases were assumed to face continuous and potentially more extreme climatic change, and particularly extreme hydro-meteorological events. The second criterion was that, in addition to the first criterion, these areas are expected to also undergo developmental (such as demographic) changes providing important implications for all actors operating within a risk governance framework.³ The third criterion is the availability of data and the degree of previous in-

³ Risk governance framework: the myriad of actors and stakeholders operating within the management, assessment, and communication of risks and includes their interactions, decision-making processes, and actions taken. See Chapter 4 for conceptual framework and description.

investigation of these areas in national and international programs and projects. In this respect, most of the cases selected have been exposed to previous examination in terms of analysis of physical properties for flooding and landslides providing documentation to support further analysis. The last criteria is the stressed importance of representation of cases from both Western as well as Eastern Europe, providing greater variation for comparison of risk assessment and risk management frameworks and for improving the usefulness of results for development of policy within the European Union and beyond. A detailed elaboration of how the case study sites were further refined within the research approach defined in this thesis, as well as information pertaining to each of the cases' physical and social context is provided in **Chapter 8 Case study spatial boundaries and contexts**.

Chapter structure and organization

Chapters 1 through Chapter 4 set up the introduction and conceptual background. The second chapter focuses on the methodological underpinnings and the general research approach. This chapter (**Chapter 2 Pursuing a highly qualitative approach**) emphasizes and elaborates the selection and purpose behind the focus on qualitative methods and also explains the research structure including how objectives, research questions, and the main aim are addressed. Chapter 2 also includes important aspects with regard to generalization, reliability, and validity as well as the researcher's role and ethical considerations. The chapter concludes with a brief section on assumptions and limitations. The third chapter (**Chapter 3 Background literature**) is set for the purpose of providing the reader with basic background knowledge and literature from the key perspectives that make up the topic pursued by this thesis. After a brief introduction, the chapter provides a list of essential key terms and is then followed by a series of sections addressing different main perspectives, namely; the changing environment, context and spatial perspective, "good" governance and risk governance, and entry points into defining "good" risk governance. The fourth chapter (**Chapter 4 Conceptual Understanding**) provides a framework and visual representation of risk governance as a system, communicating how risk governance is connected with the broader framework and can be considered in terms of inputs, processes, and outputs towards disaster risk reduction. Getting from conceptual understanding to in-practice strategies in terms of establishing what is considered to be "good" risk governance is attempted through the combination of an in-depth EU level policy analysis and an empirical evidence base garnered from fieldwork presented in Chapter 5 through Chapter 7.

Chapters 5 through Chapter 7 shift towards the more practical and policy oriented part of the research. The fifth chapter (**Chapter 5 Preliminary fieldwork and analysis**) provides and describes the observational protocol and initial fielding questions used for the preliminary fieldwork. The chapter also includes the development of categories and the creation of the interview guidelines used for the primary fieldwork, which is the focus of

the next chapter. Chapter 6 (**Chapter 6 Primary Fieldwork**) describes the purpose of the interviews and the interview and transcription process. The chapter also features a brief overview of fieldwork problems that were encountered and the efforts that were taken to overcome these issues. The seventh chapter (**Chapter 7 Building the policy understanding and creating a comparative tool**) first describes the purpose behind policy analysis and the selection of EU policy documents. An explanation is then also given to the policy analysis process and the steps that were taken towards the creation of the revised category and indicator system representing the understanding of “good” risk governance and providing a tool through which to analyze this within different spatial contexts.

Chapters 8 through 12 provides the final analysis and case study results. The eighth chapter (**Chapter 8 Case study spatial boundaries and contexts**) provides insight into the case study selection and boundary identification of cases beyond the delineations originally provided by the CHANGES project. The chapter also gives a basic structure and introduction to the physical and social contexts of both the main cases and satellite cases presented in this research. Chapter 9 (**Chapter 9 Introduction to results for understanding “good” risk governance within different contexts**) providing a necessary transition and introduction in getting from the context background of the cases to how the analysis tool is applied in the different contexts of these cases. Chapters 10 (**Chapter 10 Nehoiu catchment (Romania)**) and 11 (**Chapter 11 Barcelonnette catchment (France)**) provide the details of the main case results and are similarly structured including the results summary, results presented by category, and connection mapping. This information in addition to inputs from the satellite cases are presented in Chapter 12 for the multi-case comparison (**Chapter 12 Multi-case comparison: main and satellite cases**). The chapter includes the comparison of key issues by category as well as observations and issues for actors and regulatory frameworks and key factors and connecting points with respect to risk culture.

Chapter 13 Reflections and **Chapter 14 Recommendations & Conclusion** make up the last two chapters. The reflections chapter discusses and reflects upon the “good” risk governance analysis tool in terms of what worked well what did not in addition to communicating key connecting points between the “good” risk governance principles. A reflection on the spatial dimension in general research approach is also provided. The last chapter describes recommendations for and good practice examples found within the case study sites. The chapter also provides recommendations for EU policy development and concludes by addressing critiques, gaps, and further avenues of research.

Chapter 2

Pursuing a highly qualitative approach

The chapter first goes into detail describing the purpose behind the selection of the highly qualitative, exploratory and descriptive nature of the research approach. This is further supported by a brief explanation of the specific methods chosen for this research. A diagram is provided to help visualize and guide the reader in understanding the general research structure and important foci. This visualization additionally communicates how the aim, objectives and research questions are addressed in the pursuit of the approach. This highlights the relevance of the approach to the topic at hand and how the methods employed will be used for data collection, analysis, and in the presentation of results. Important components of this chapter also include a brief explanation of the data requirements and, for the purpose of clarifying and adding transparency to this empirical practice, sections on generalization, reliability and validity (Section 2.3), the researcher's role and ethical considerations (Section 2.4), as well as assumptions and limitations (Section 2.5) are provided.

2.1 Methodological underpinnings and research approach

Pragmatic borrowings from constructivist and post-positivist paradigms

The research contains both applied and theoretical aspects, combining applied policy research and general qualitative research for conceptual development. The approach is applied yet also theoretical because it works toward establishing an understanding of theoretical concepts of (e.g. good governance into risk governance concepts) while also interweaving this with insight and application of substantial practical evidence. The research approach, furthermore, does not follow one specific, unique paradigm. Rather, it borrows from multiple paradigms, ultimately taking a pragmatic stance to the overall research approach. This use of pragmatism is concerned with means and ends in science, connecting

to practical implications and establishing understanding (Age 2011). The research takes an informed, pragmatic stance that can be seen as going beyond a simply “what works” approach, as it also considers the differences between various paradigms, their application, and the key methodological differences. The approach thus addresses the issue raised by Denzin (2012), in his critique of Howe (1988)’s use of “what works pragmatism”; more specifically, in that using multiple methodological frameworks may be scientifically sound, but that “[i]t is a mistake to forget about paradigm, epistemological, and methodological differences between” different frameworks (Denzin 2012, p 83). In adhering to this important consideration, this section explains what is held in common with different frameworks and methodological approaches.

From the practical insight part of the approach, one can see a strong connection and borrowing from constructivism. This borrowing is highlighted nicely in the definition of constructivism according to Guba and Lincoln (1994) in their chapter on Competing Paradigms in Qualitative Research, in which they state that “[t]he aim of the inquiry is understanding and reconstruction of the constructions that people (including the inquirer) initially hold, aiming toward consensus but still open to new interpretations as information and sophistication improve” (Guba and Lincoln 1994, p 113). This is essential in trying to build upon establishing an understanding of good governance within risk governance, especially through the use of hermeneutic (or interpretative) methods for reconstruction of perspectives held by key actors who must manage disaster risk. This interpretation supports the inductive aspect of the overall approach. This aspect is found through the selected cases which are used as a unit to build up investigation, to identify patterns and to look for evidence toward the broader theory.¹ A generic theory basis is used to initiate the analysis of the topic at hand (i.e. through a conceptual understanding of the topic, see Chapter 3), but is inductively developed and expanded through the use of case studies.

From the theoretical concepts side, the research does not seek to establish one common truth to be found through the pursuit of objective knowledge and falsification of existing conjectures. The approach therefore does not borrow from the positivist paradigm as would be understood within the framework proposed by Karl Popper (see Popper 1972, 2002).² The main reason for this is that the research pursuit is not based on “the traditional approaches which dominate the natural sciences”, a common epistemological basis of

¹ The detailed explanation of the local level case study selection process is explained within a separate introductory chapter (see Chapter 8 Case studies and empirical results introduction). The reason for this separate explanation is due to the special nature of the pre-selection of case studies by the parent project (CHANGES) within which this research was conducted.

²This reference, (Popper 2002), was originally published in German in 1935 under the title *Logik der Forschung*. The English version referred to within this thesis is from the later publishing in 2002 in the Routledge Classics.

the positivist paradigm (Burrell and Morgan 2008, p 5). However, some connection can be made to post-positivism. The research follows post-positivism's departure from positivism in assuming that, though a reality exists, it is not completely apprehensible in all its complexity (Guba and Lincoln 1994). This is particularly pertinent in dealing with a reality in which unknown unknowns persist, such as a changing climate and potentially increased frequency and intensity of hydro-meteorological extremes. The approach can be understood to touch upon and draw from post-positivism as it makes preliminary assumptions about this reality with respect to understanding key concepts and in looking for "... explanations of pattern phenomena" to explain them (Tracy 2013, p 39). This highlights the more deductive logic of the approach by starting with good governance theory and concepts of risk governance, and then explaining and breaking down their components (see Chapter 3 for background literature, Chapter 4 for conceptual explanations, and Chapter 7 for connections to policy). Though this deductive side of the approach is not as intensely pursued as the inductive logic and would almost seem in contradiction to the constructivist foci, this connection within the research can be understood to start with a body of literature that is already established (i.e. what "good" governance principles are). The approach then expands upon this through policy analysis and uses cases to support whether or not, or to what extent the notions concerning these principles are true in-practice. However, considering that the overall outcome of the approach works toward the creation of reflections and recommendations for general and specific cases, as well as an understanding of how these might influence how concepts of "good" risk governance are comprehended and utilized, the overall result of the research again leans the pursuit toward a more constructivist and inductive reasoning. This provides direct connection in the approach to the use of aspects of grounded theory methodology.

Connections to grounded theory methodology

Though the approach does not go so far as to propose a whole new theory in itself, the interpretive nature and the need for context follows nicely into explaining connection to grounded theory methodology as originally developed from Barney Glaser and Anselm Strauss (see original work in Glaser and Strauss 1967; Strauss and Corbin 1994). Where the research cannot arguably be completely encompassed within grounded theory methodology lies in the fact that a conceptual framework is developed and exists before the gathering of empirical evidence from the case studies (again reflecting the deductive logic of the approach). Grounded theory methodology as originally intended assumes that no preconceived conceptual framework or theory exists (Glaser 1978), especially in order that these preconceived notions do not restrict the concept building capabilities of the research pursuit (Glaser 2002). This point highlights a departure in the research from a purely grounded theory methodology approach. However, connection to this methodology lies in a number of points including: a need for "fit" to data, continuous modification and theo-

retical coding, and usefulness.

With regard to “fit” to data, this is taken to mean that the concepts derived from the research must correspond well to the data and are able to adequately describe the patterns found within this data (Glaser and Strauss 1967). This can be seen as similar to Popper’s correspondence of facts (Age 2011). This correspondence is, furthermore, important as concepts developed “. . . must correspond closely to the data if [they are] to be applied in daily situations” (Glaser and Strauss 1967, p238). This “fit” is achieved in the research by maintaining a very localized focus, directing inquiry to the daily situation and present strategies of those affected by hydro-meteorological hazards at the local level. The bulk of the empirical information gathered through interviews also shapes the direct outcome and interpretation of the identified patterns and the analysis tool (“good” risk governance index) itself, enabling a closer fit “to the substantive data, . . . [which] is a powerful condition for usefulness [and] can be a matter of ‘understanding’ as well as of direct application” (Strauss and Corbin 1994, p 281). Efforts to maintain this “fit” are additionally supported in the research through continuous comparison (also known as continuous modification) throughout the data collection and analysis phases of the research process.

Continuous comparison provides a constant interplay between both data collection and analysis, typically involving an overlap between the two (Huberman and Miles 2002; Strauss and Corbin 1994). This can be found in the iterative parts of thesis research, specifically with the development of the analysis tool, its use, and its revision requiring the need for constant modification and an overlap of both collection and analysis of data. This overlap and continuous modification working toward the development of a theory or concept is a central tenant in grounded theory methodology that, as stated by (Glaser 1978), “. . . is an ever modifying process [in which] nothing is sacred if the analyst is dedicated to giving priority attention to the data” (Glaser 1978, p 5). Theory in this sense is generated through the continuous input of data. Strauss & Corbin (1994) further state that in following grounded theory, an existing theory or concept can be used or can be generated from the initial data, but that these may be elaborated and modified as incoming data are meticulously played against them” (Strauss and Corbin 1994, p 273). This building upon and elaboration achieved in continuous comparison enables the researcher to conduct theoretical coding; the building up of a broader theory through the integration of connected concepts, enabling transcendence to a greater conceptual level beyond preceding theories (Glaser 1978).

Grounded theory allows for this emergence of concepts and development of theory, while maintaining a strong relevance and usefulness to the topic context and actors thereof. Relevance is derived through context specific data collection and interpretation, contributing

to an on-the-ground understanding of in-practice strategies. The effectiveness of this understanding supports the usefulness of the concepts derived and results achieved for the actors involved in the topic at hand (Age 2011). This, in essence, asks the researcher to consider what is useful for these actors; thus, requiring a need for understanding multiple perspectives (Glaser and Strauss 1967). Emphasis is therefore placed on interpretation of the perspectives of actors within the studied context. With respect to the research presented in this thesis, this refers to the actors within each case study who are involved in the assessment, management, and communication of hydro-meteorological risks. The connection of the perspectives of these different actors to "... patterns and processes of action/interaction that in turn are linked with carefully specified conditions and consequences" provides an important transition to the necessity of context specificity and the need for a case study approach (Strauss and Corbin 1994, p 280).

Supporting case study research

In stressing the importance of context, specifically in understanding actors and different perspectives, the overall approach is well served by engaging in case study research. This research strategy is considered to be a preferred strategy in addressing "how" and "why" questions in research and is, furthermore, pursued when the researcher "has little control over [the] events" that are analyzed, and when the phenomena itself has "some real-life context" (Yin 2009, 2003, p 1). All three of these characteristics apply directly to the research at hand, considering that the research attempts to establish and expand upon a better understanding of risk governance, is conducted in an environment where the researcher has no control over the current and past events, and involves direct application to the real-life consequences of these events on local communities. Especially with regard to this last characteristic, the overall approach benefits from case study research as opposed to other methods in that "... it can 'close in' on real-life situations and test views directly in relation to phenomena as they unfold in practice." (Flyvbjerg 2006, p 235).

Pursuing case study research can have its disadvantages depending upon the purpose of the research inquiry. This can occur "[w]hen explanation, propositional knowledge, and law are the aims of an inquiry..."; however, as in the case of this thesis, when the purpose is to achieve greater "understanding, extension of experience, and increase in conviction in that which is known, [this] disadvantage disappears" (Stake 1978, p 6). This is reiterated by (Gerring 2007, p 116) who affirms that case studies are useful in the pursuit of more exploratory research that looks into causal mechanisms rather than confirmatory causal effects (see Gerring 2007, p 116).

Another purported disadvantage is that dealing with small n-values, as is common in case study research, may not yield results that significantly contribute to understanding a

greater phenomenon. However, in the case of qualitative social inquiry, “. . . the sheer number of examples of a given phenomenon does not, by itself, produce insight.” (Gerring 2007, p 99). Case studies can be used for providing description, testing theory, or generating (Eisenhardt 2002) and, according to Flyvbjerg (2006, p 222), provide “[c]ontext-dependent knowledge and experience [that] are at the very heart of expert activity” (Flyvbjerg 2006, p 222). Flyvbjerg further states that this experience gained through case study research is what enables one to progress from beginner to becoming an expert in one’s field. Case studies also enable a “. . . sharing [of] approaches, strategies, and experiences. . .” in which “[t]elling the stories of both successes and failed efforts can provide a rich source of data with which to generate new solutions” and, furthermore afford the researcher the ability to see both uniqueness of particular places and what can be “. . . generalized across contexts.” (Squires et al. 2014, pp 372-373).³ In providing this contextual information, case studies can bring the researcher toward a greater understanding of a larger phenomenon and its application to a larger population (see Gerring 2007, p 95; Flyvbjerg 2006, p 222). Analyzing across cases (and their contexts) toward a greater understanding is indeed what the present research attempts.

Information gleaned from cross-case analysis sheds light into what can be held in common, and each individual case analyzed yields a uniqueness that depends on specific context (Stake 1994). In the case of this research, this refers to different actors, cultural norms, and regulatory frameworks. The cases analyzed can provide insight into different steps of the policy process and the implications of this process (Roe 1994, p 2). This is important especially given that this topic delves to a certain extent into decisional behavior as “case study research may offer insight into the intentions, the reasoning capabilities, and the information processing procedures of the actors involved in a given setting” (Gerring 2007, p 103). Connections to understanding this process within a given context and the theoretical connection of the research to policy analysis theory merits explanation and is provided in the following section, offering a further stepping stone toward the research structure.

Using policy and policy analysis to enhance understanding

The overall approach to the research relies in substantial part on the use of policy and policy analysis from the field of policy research to help provide the knowledge needed for understanding “social policy concerns” (Ritchie 2003, p 26). There is also a direct application to the consideration of in-practice strategies within a given context. This is highlighted through the tenet that policy acts as a conduit for the understanding of proposed and also (when applied) implemented actions (Galperin and Wilkinson 2015). More specifically, the approach considers interpretative policy analysis, connecting directly to the central methodological focus of interpretivist and pragmatic theoretical underpinnings. The key

³The topic of generalization is revisited in more detail in a later section of this chapter.

connection lies in the focus on meaning as the main characteristic of interpretive policy analysis (Yanow 2007, p 110). This attention to and pursuit of meaning enables a “ferret[ing] out an understanding of the context within which a policy debate takes place, which itself can lead to understanding of how the debate is being framed. . . and why it is being framed that way” (Yanow 2007, p 113). Gaining perspective on policy frames and the central foci of debate within policy development involves attention to stories and rhetorical argument, bringing in local knowledge and, in the process, generating relevance “to the social context to which policy is applied” (Fischer 2007, p 225). The focus on argumentation in dealing with real world concerns and connection to perception and practice connects nicely to the interpretivist and postpositivist borrowings of the approach. This highlights, furthermore, connection to the theoretical perspective provided in the Argumentative Turn, a development within social science discourse belonging to the fields of public policy and in the (very broadly used) concept of policy analysis.

In borrowing additionally from the Argumentative Turn, the approach continues along the post-positivist strand of methodological departures, utilizing “a major strand in the contemporary study of policy making and policy theory development” that has from “the outset, . . . emphasized practical argumentation, policy judgment, frame analysis, narrative storytelling, and rhetorical analysis, among others” (Fischer and Gottweis 2012, p 1). The strand has also, more recently, developed to include application within topics relevant for the research’s current pursuit including governance, local knowledge, collaborative planning, and interpretive methods (Fischer and Gottweis 2012). The Argumentative Turn, furthermore, emphasizes that policy analysis needs relevancy to its addressees, echoing the “relevance” component found within the basis of grounded theory methodology addressed earlier in this section. In doing so, the strand draws attention to both interpretation and praxis by analyzing policy for the purpose of understanding and informing addressees regarding “the thought and deliberation of politicians, administrators, and citizens.” (Fischer and Gottweis 2012, p 2). In maintaining these foci, the Argumentative Turn according to (Fischer 2007) can provide a more accurate depiction of policy process and:

. . . offers, as such, an approach better suited to real world policy making than the conventional positivist model which emphasizes empirical analysis at the expense of normative investigation. By demonstrating how both the empirical and normative concerns that emerge in policy argumentation are interrelated, the model is offered as a way forward in the search for a more socially relevant postpositive alternative (Fischer 2007, p 235).

Similarly to the overall research approach presented in this thesis, the Argumentative Turn, therefore, rejects the notion of a value-free, technical, narrowly empirical focus of neo-positivist theory and stresses the need for the combination of both empirical and nor-

mative components of argumentation in understanding policy process and values (Fischer and Gottweis 2012; Fischer 2007). It rejects the determination of universal truths, and attempts to investigate the relationships between different considerations and arguments and the potential implications these have on actions taken (Fischer 2007). This emphasis on social construction and understanding context, again much like the key foci found in grounded theory and case study research, remedies deficits found in technocratic approaches, which are often insufficient to address messy problems riddled with complexity and uncertainty. There are no clear cut solutions especially for complicated topics like climate change and disaster risk management, particularly in considering that with respect to these topics “[c]ontemporary policy problems facing governments are more uncertain, complex, and often riskier than they were when many of the theories and methods of policy analysis were first advanced” (Fischer and Gottweis 2012, p 3). In borrowing from these facets of the Argumentative Turn, the research is assisted in building understanding amidst complexity and uncertainty by focusing on an interpretive approach to meaning as it pertains to management and actions in the governance of risks. The complexity of the topics, its understandability, and the key perspectives of different actors involved in risk governance within a changing environment and in a given spatial context goes along well with the theoretical implications and encouragement of the use of interpretive analysis in constructing solutions for messy challenges, and in attempting to grasp the complexity of human perception in dealing with these challenges (Yanow 2007; Fischer and Gottweis 2012). In referring to Bevir and Rhodes (2003), Wagenaar (2007) considers the importance of grasping meaning through the assumption that “policy formation and implementation, or broader, the activities and interactions of government agencies, public officials and their publics in civil society, cannot be properly understood unless we grasp their relevant meanings (Bevir and Rhodes 2003)” (Wagenaar 2007, p 429). Establishing understanding is, furthermore, part of the purpose in engaging in social science methods related to exploring policy and planning and to (in part) explain “what’s going on” in the current and future political world (Forester 2006, p 125).

This brings the discussion to a transition between the methodological underpinnings and the methods which are selected and supported by the basis employed in the structure of the research approach. The methods employed through this approach attempt to make “visible” the commonly invisible or intangible units of analysis in social and policy sciences (Wagenaar 2007). Creating this visibility can be attained through gaining information about perspectives of various actors in order to better grasp the world in which the phenomenon under investigation plays out. Gathering and processing these perspectives allows one access to enhanced understanding, which can be viewed as particularly helpful given the assumption maintained by the research that there is no access or existence of perfect information or singular truth (Forester 2006). The method of creating and analyzing

narratives is one way in which to pursue this “gaining of perspectives” and the combination of them into “metanarratives” can assist in identifying patterns and learning points both within and across cases for the topic at hand. This is not strictly followed in the analysis and results chapters in terms of proper narratives with beginnings, middles, and ends (Kaplan 1993), but it is echoed in purpose and conduction of the case summaries and cross-comparison. Given the complexity of the topic at hand, using a metanarrative helps in communicating key points and results in building an overall understanding of issues within cases and across (also even in the case that there are conflicting perspectives) (Roe 1994). This enables collection of a multiplicity of voices (Roe 1994, p 4) and is carried out within the presented research structure via methods including interviews and observations within different cases and policy document analysis at a common level across cases (i.e. EU level). One of these “voices” within the research at hand, for example, is the policy narrative at the EU level for the topic; while the other voices are those of the key informants who are influencing and creating policy at more local (sub-national) levels.⁴

Through the aforementioned methods, one gains local knowledge from these voices which reveal information about outcomes of current policy as well as the “subjective desires of the people” influencing, developing, and putting these policies into place (Forester 2006, p 135). Collecting and analyzing data through the case studies, also enables a combination of these data collection methods (i.e. interviews and observations) (Eisenhardt 2002). This can allow triangulation of multiple perceptions from informants, such as key actors and important stakeholders in a given case study site, and assist in clarifying and “. . . identifying different ways the phenomenon is being seen” (Stake 1994, p 241). Gathering this information is, furthermore, possible through the researcher placing herself within the studied context. As a process of human learning, this in situ method allows the researcher to discover and achieve an advanced understanding through closer proximity to the studied context (Flyvbjerg 2006, p 236). However, this gathering of data as well as its analysis must be done well through preparation and with transparency of process to ensure quality of the overall research pursuit. The next section of this chapter elaborates the steps taken throughout the research process and refers to, as relevant, additional chapters in which further elucidation is provided for these different steps. The structure highlights the different elements of practice, theory, and policy addressed within the research process and at which points these occur, including reference given to their relevant chapters.

⁴What is determined as “local” is explained in greater detail in Chapter 8, which provides an explanation of the case study and “local” case selection.

2.2 Research structure and explanation

The parts of the research presented in this section provide the introduction, set-up, and connecting points between the fieldwork chapters that follow (Chapters 5-7). Furthermore, the chapters that follow will provide greater elaboration of the content and development process of the various fieldwork stages. **Chapter 5 Preliminary fieldwork and analysis** will elaborate further into the first stages of the fieldwork beyond what is presented in this chapter; while **Chapter 6 Primary fieldwork** will provide the elucidation of the second stage of the fieldwork processes. **Chapter 7 Building the policy understanding** moves the discussion toward the development and understanding of the policy analysis process, expanding the dialogue surrounding theoretical underpinnings for “good” risk governance. These stages within their respective parts (practice, theory, and policy & validation) are visualized in Figure 2.1. The legend provides a brief explanation of the meanings behind the colored coded boxes and structure. Boxes in blue indicate parts of the research comprised of primarily data collection processes. The green boxes represent primarily data analysis processes; while the dotted green indicate sub-analysis processes. The black boxes provide what is termed in this research as “macro” identifiers, which are used in order to highlight connections of the parts of the research process to practice and theory as well as to policy development. The orange boxes indicate an output of the overall research approach, and include both the revised category and indicator set and results. The red lines and arrows communicate the directional flow of the research process. The figure also communicates at what points in the research process the objectives and research questions are addressed through the purple text found throughout the diagram.

Preliminary fieldwork was conducted to establish an initial understanding of the case study contexts. This involved the formulation of an observational protocol which was used to help guide observations made during the preliminary stakeholder meetings. The guidance included a list of four goals: to understand the physical environment, to establish initial stakeholder contact, to establish the proper unit of analysis, and to gather notes on understanding what are some of the characteristics of risk culture within this setting. This first process was part of the in-practice part of the overall approach as it involved direct contact with practitioners and assisted in building an understanding of the local context. Gathering this information helps address **Objective 2** *Establishment of what is the spatial context in which risk governance processes occur within each case study area through both desk study research and fieldwork* (please see Table 2.1 for brief summary of how each objective is addressed in the research process). The information along with the initial contact to local partners and stakeholders established in the preliminary fieldwork also serves as an important input for the process of identifying key stakeholders and determining the appropriate administrative unit of analysis. This identification complements the in paral-

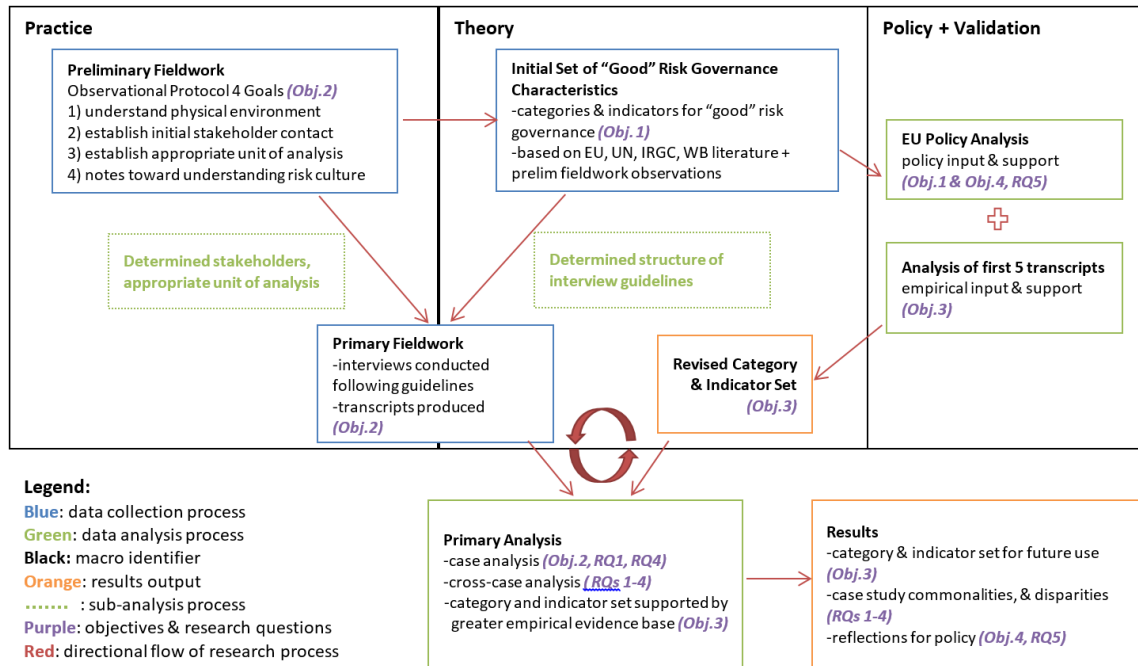


Figure 2.1: Research structure and explanation

level theoretical work of establishing an initial set of “good” risk governance characteristics; while both feed into the primary fieldwork.

Establishing the initial set of “good” risk governance characteristics involved the creation of a list of general “good” risk governance categories based on EU, UN, IRGC, and World Bank literature as well as general observations from the preliminary fieldwork. An initial brainstorm of potential indicators based on these sources was also conducted for each category. This created the entry point into addressing **Objective 1** *Characterization of what is “good” risk governance* and provided a direct input into helping establish the structure of the interview guidelines for the primary fieldwork.

Primary fieldwork involved the completion of expert interviews following interview guidelines aimed at recognizing and addressing the different “good” risk governance characteristics. Transcripts were produced as a result of these interviews and provide a further, and substantial, evidence base for addressing **Objective 2**.

Running concurrently to conducting the primary fieldwork and transcribing interviews, an in-depth analysis of EU policy documents was completed in order to generate an improved and revised category and indicator system. This analysis is seen as a common denominator (EU level policy) for all cases and helps to address both **Objective 1** and **Objective 4** *Reflection and recommendations for future policy development at EU and case study levels* as well as **Research Question 5** *Can the insight gleaned from the local level provide*

Objectives	How they are addressed in the research process
Obj. 1 Characterization of what is “good” risk governance	<ul style="list-style-type: none"> - categories & indicators for “good” risk governance, from Initial Set of “good” Risk Governance Characteristics within Theory macro identifier - policy input & support, from EU Policy Analysis in Policy + Validation
Obj. 2 Establishment of what is the spatial context in which risk governance processes occur within each case study area through both desk study research and fieldwork	<ul style="list-style-type: none"> - Observational Protocol 4 Goals, from Preliminary Fieldwork in Practice - interviews conducted following guidelines, from Primary Fieldwork - case analysis, from Primary Analysis
Obj. 3 Operationalization of risk governance through use of an indicator system to establish the basis of analyzing the empirical work in each study area	<ul style="list-style-type: none"> - empirical input & support, from Analysis of first 5 transcripts - Revised Category & Indicator Set - category and indicator set supported by greater empirical evidence base, from Primary Analysis - category & indicator set for future use, from Results
Obj. 4 Reflection and recommendations for future policy development at EU and case study levels	<ul style="list-style-type: none"> - policy input & support, from EU Policy Analysis in Policy + Validation - reflections for policy from Results

Table 2.1: Research objectives and how they are addressed

important implications for EU level policy development (please see Table 2.2 for brief summary of how each research question is addressed in the research process). As an extra mechanism of validation, this process was supported with a “check” or validation through the use and analysis of the first five interview transcripts. This provides further use and integration of the evidence base supporting fulfilment of **Objective 3** *Operationalization of risk governance through use of an indicator system to establish the basis of analyzing the empirical work in each study area*. This part of the research pursuit is under the macro identifier “Policy + Validation” as it does not strictly fall only within practice or theory. Aspects of the policy analysis arguably fall within both of the other parts. However, in providing a clear communication of the research structure, and also in reflection of the significance of these processes within the overall research approach, it was appropriate to visualize the policy and validation within a separate identifier.

The policy analysis connects to the primary fieldwork through the output of a revised category and indicator set, providing the primary input for achievement of **Objective 3**. The process of creating and then using this set enabled an iterative procedure through which the set is used as a common tool for the analysis of interview transcripts and information gathered in the primary fieldwork. This procedure, at the same time, enables a reflection as to the usefulness of the tool for this purpose, and particularly with respect to how well the set encompasses the issues expressed by the interviewees themselves. The procedure leads into the primary analysis through the creation of an improved category and indicator

Research Questions	How they are addressed in the research process
<p>RQ 1 Do strategies and practices therein reflect “good” risk governance principles? (Main question)</p> <p>a. Is what is considered “good” risk governance practices, the same in each case study and among the different actors?</p> <p>b. Are there practices which could be considered best practice examples?</p>	<ul style="list-style-type: none"> - (Main question) case analysis, from Primary Analysis; case study commonalities, & disparities from Results - (a) cross-case analysis, from Primary Analysis; case study commonalities, & disparities from Results - (b) case analysis, from Primary Analysis
<p>RQ 2 Do the key actors and the distribution of their roles and responsibilities differ among the study sites?</p>	<ul style="list-style-type: none"> - cross-case analysis, from Primary Analysis - case study commonalities, & disparities from Results
<p>RQ 3 Do the most relevant regulations (both formal and informal) which make up the policy framework for disaster risk management dramatically differ?</p>	<ul style="list-style-type: none"> - cross-case analysis, from Primary Analysis - case study commonalities, & disparities from Results
<p>RQ 4 Are there important cultural factors which influence risk decision-making processes (e.g. aspects of political or organizational culture)?</p> <p>a. Do these factors substantially differ among the case study sites?</p>	<ul style="list-style-type: none"> - case analysis, from Primary Analysis - (a) cross-case analysis, from Primary Analysis; case study commonalities, & disparities from Results
<p>RQ 5 Can the insight gleaned from the local level provide important implications for EU level policy development?</p>	<ul style="list-style-type: none"> - policy input & support, from EU Policy Analysis in Policy + Validation - reflections for policy from Results

Table 2.2: Research questions and how they are addressed

set supported by greater empirical evidence base (again providing further input for achieving **Objective 3**). The finalized category and indicator system (with reflections as to its improvement) are part of the key results of the research as a whole and can be seen as a tool for future scientific and policy investigation.

The primary analysis also enables the gathering of information for the individual case analysis, providing substantial (especially context-related) input for achievement of **Objective 2**. This information also provides important evidence used in the efforts to address **Research Question 1**, specifically the main research question: *Do strategies and practices therein reflect “good” risk governance principles* and the sub-question **(b)** *Are there practices which could be considered best practice examples?* The first is achieved through analysis and presentation of the results of using the operationalized “good” risk governance category and indicator set to analysis the interview transcripts from each of the case study sites. The part **(b)** of this main research question is addressed by taking data from the interview transcripts and sharing what has been identified by the interviewees themselves as good practice examples within their specific spatial context. Sub-question **(a)** of the main research question *Is what is considered “good” risk governance practices, the same in each case study and among the different actors* is addressed through the cross-case

component of the primary analysis. This comparison also serves as an evidence base for **Research Questions 2 through 4** and yields the information necessary for identifying case study commonalities and disparities, providing furthermore another key part of the overall research results. Reflection of the general “good” risk governance principles and their application across cases also provides further evidence for addressing **Research Question 1**. Taking this a step further and expanding the reflection to consideration for policy implications also enables the final evidence base needed in addressing **Objective 4** as well as **Research Question 5**. All of these work toward achievement of the main aim *to provide reflections and recommendations for strategies that are commonly applicable as well as those elements that have to be tailor-made for the local context of each case*. In attempting to fulfil these objectives and research questions and achieve this aim, attention must be paid to generalization, reliability and validity, particularly in their broader applications in connection to purpose and verification of chosen methods.

With respect to the approach process described above, a brief mention should be made with respect to the use of the case study sites. Although there are a total of four cases used within the research pursuit (reflecting all four of the CHANGES project case study sites), these are divided into two main cases and two satellite cases which are introduced and explained in greater detail in Chapter 8. All cases follow and are used to support the above process; however, the main cases (located in France and Romanian) are investigated and results presented individually. Through the course of the research, it became evident that a differentiation in the depth of analysis of the cases could be employed to reduce quantity but not overall quality of the research approach. This furthermore helped ensure a more reasonable balance between depth and breadth of material and still enabled the ability to achieve the objectives and aim of the research pursuit. The selection of the two main cases was based on specific criteria: 1) the two appeared to represent the most diverging cases (extremes) of the four cases; 2) selection allowed for representation of a country that had recently joined the EU (Romania) and one which is one of the longest standing, founding members (France); 3) this also permitted the use of a detailed analysis for one of the two eastern European countries and one of the two central European countries as well as one from each of the two mountain ranges represented in the CHANGES project.

2.3 Generalization, reliability, and validity

Generalization

The research attempts to also achieve findings for both empirical and theoretical generalization. The former can be understood in a ‘receiving context’ as it refers to applicability of the findings to populations (or in this case local communities) outside and beyond those investigated within this research approach (other, in this case, ‘local’ contexts in which

this could be applied). The latter, is taken as addressing and adding a ‘theory building’ aspect of the research in which the conclusions drawn add or assist in developing theory and in establishing a better understanding of wider social policy (Lewis and Ritchie 2003). In the case of this research, findings assist in furthering our understanding of “good” governance theories within risk governance, how this is thought of in policy, and how this is connected and applies in-practice (again, connecting the research to both theoretical and applied foundations of qualitative research).

As for representational aspects of this generalization, a note should be made with regard to sample size. As has been stated in a previous section of this chapter, having a large n-value is not relevant for the purpose and structure of the research approach, particularly as statistical significance plays no part in this highly qualitative research pursuit. Representational generalization was pursued through the selection of and attempt to reach a wide range of stakeholders at both regional and local levels to help ensure that the studied phenomena (risk governance processes) are adequately captured and reflect the perspectives of the key actors involved in these processes within each case study.⁵ As for the ability to infer or generalize findings to other contexts, the research adopts the understanding of Robert Stake in his explanation of a more ‘naturalistic generalization’ within case study research, specifically in “[t]hat knowledge is a form of generalization. . .” which can be “. . . arrived at by recognizing the similarities of objects and issues in and out of context and by sensing the natural covariations of happenings” (Stake 1978). Stake points to a key tenet of the research at hand, that knowledge is generated through the recognition of similarities and general patterns across contexts (e.g. within and across multiple case studies), and that this knowledge can be used for generalization across and beyond these contexts.

To add rigor in pursuit of this knowledge and in the attempt to achieve adequate representation, substantial effort was made toward enhancing the reliability and validity of the research approach.

Reliability

The ability to generalize, and even apply, findings of the research to other contexts and towards wider theoretical and social understandings rests in part on the reliability (often synonymous with replicability) of the findings. The presented approach does not assume that an exact replica of research findings is achievable, especially given the personal nature of the collected primary data (stakeholder perspectives). However, the concepts and general understanding derived from the research process are assumed to be made possible through the confluence of ideas and concepts as well as the clarity and transparency of the research process itself. In ensuring clear communication of the research procedures,

⁵ This is revisited in the explanation for internal validity later in this section.

the research attempts to enhance the quality of the approach and to provide a sort of “methodological accounting” that can “assist readers in evaluating the quality of conclusions” (Seale 1999). Explicit tactics used in this research to ensure a clear accounting were inspired by examples from Yin (2009) and include the use of an observational protocol for the preliminary fieldwork, the development of a case study database (as well as a policy analysis database), and a coding validation test. The observational protocol (see Chapter 5) provides guidelines followed and goals pursued for the preliminary phases of the fieldwork; while the description and use of the databases for both the primary fieldwork (see Chapter 6) and policy analysis (see Chapter 7) generates a transparent procedure for other researchers to potentially replicate. A coding validation test was additionally pursued to test the usability, ease of understanding and replicability of the coding analysis using these databases and the category and indicator system created in this approach. The transparency of the documentation of these parts of the approach also assists in establishing the validity of the research approach, particularly in making possible the ability of the reader to evaluate the applicability of conclusions in settings within and beyond the cases presented (Lewis and Ritchie 2003).

Validity

With regard to validity, the research here address three types: external validity, internal validity, and construct validity, as defined within Yin (2009). How the research applies these tests, and that of reliability is highlighted within Table 2.3. Robert Yin, takes these typical tests of validity used in qualitative research and applies them directly to the specific niche of case study research.

External validity, as it is addressed within this research, connects to generalization with respect to: analytic generalization, in which “. . . the investigator is striving to generalize a particular set of results to some broader theory” (Yin 2009, p 43); relating to theoretical generalization, or to a broader population or setting beyond the studied cases (Maxwell 2002); and to empirical generalization. This is assisted through the holistic, multiple-case study design of the research approach. Using multiple cases to better understand a particular phenomenon enhances the robustness of the research (Herriott and Firestone 1983). However, it is important to remember that within the multiple-case design, the individual cases themselves (and their individual analyses) are not lost. The analysis of each of the individual cases enables case-specific convergence of information and results to relate to the broader theoretical understanding of the studied phenomenon, while providing the basis for potential replication logic across the other cases and beyond. Analysis across these cases lends itself to theoretical validity in that “. . . it goes beyond concrete description and interpretation and explicitly addresses the theoretical constructions that the researcher brings to, or develops during, the study” highlighting both the applied concepts and an

Test	Case Study Tactic Used	Phase of research in which tactic occurs
Reliability	• Observational protocol used for preliminary fieldwork	Data collection
	• Case study database for primary fieldwork	Data collection
	• Database for policy analysis process	Data analysis
External validity	• Application of broader theoretical concepts in single-case study analysis	Research design & data analysis
	• Using multiple-case studies to enable replication logic across contexts	Research design & data analysis
Internal validity	• Sample coverage through key informant selection and achieving representational goals	Research design & data analysis
	• Display of data as “true” as possible through clear traffic light output and supporting evidence explanation	Research design & data analysis
Construct validity	• Triangulation of multiple sources of evidence including data from interviews, observations, and policy document analysis	Data collection
	• Chain of evidence established via detailed description and referencing throughout reporting structure	Data analysis

Table 2.3: Summary of validity and reliability tactics used in the research approach. Adapted from Yin (2009, p 41).

understanding of their existing relationship patterns (Maxwell 2002, p 50).

The test of **internal validity**, as stressed by Yin, is not relevant for exploratory and descriptive research as the focus of this validity test is on proving causation Yin (see 2009, p 40-43). Though the research approach agrees with this assertion, a brief discussion of the relevance of internal validity should be visited as it applies within the understanding of Lewis and Ritchie (2003). This has to do with whether or not the perception of the studied population (in this case local and regional level stakeholders) is accurately portrayed and communicated.

Efforts throughout the research process were made to try to ensure this accuracy, particularly for internal validity issues related to sample coverage and display of data (Lewis and Ritchie 2003). With regard to the former, a set of criteria were used in the selection of potential interviewees. This was first pursued through developing a list of the different types of stakeholders groups that were discovered upon an initial literature review and revised after the preliminary field site visits. Representational goals were made for the

scope and coverage of these categories; namely that at least 15 key informants would be interviewed, with representation from both local and regional levels for each case study site, and within these 15 there should be as wide a range across different types as possible. All representational goals were met (see Chapter 6 Primary fieldwork for elaboration). Key informants were chosen as, according to Marshall (1996), they enable the gathering of potentially high quality expert information to be collected within a relatively short amount of time. The display of data refers to how well the presented findings are still “‘true’ to the original data” and permit one to see how the results of analysis were derived (Lewis and Ritchie 2003, p 274). This was pursued through a simplified procedure for interpretation of interview data based on the traffic light system, indicating a direction toward positive (Green), negative (Red), or neutral (Yellow), followed by an explanation of the evidence for the direction. The evidence as presented attempts to stay as close as possible to the original (positive, negative, or neutral) perception provided in the interviewees’ statements.

For **construct validity**, this can be understood as “identifying correct operational measures for the concepts being studied” (Yin 2009, p 40). This is achieved through both triangulation through using multiple sources of evidence and through creating a chain of evidence (Gibbert and Ruigrok 2010). Different types of evidence used within this research include: policy and legal EU level documents (secondary data); interview data from key informants (primary data); and observations gathered for the observational protocol, especially in understanding case study area environments, making behavioral notation of different actors, and taking photos of the surrounding area (primary data). Using these multiple sources of evidence enables a process of triangulation and corroboration, creating a convergence of lines of inquiry. The opportunity to use multiple sources of evidence helps strengthen the understanding of the broader phenomenon through this convergence, but does not assume that there is only one objective or singly “correct” reality to be derived from this data (see Gibbert and Ruigrok 2010; Silverman 2006). Creating a chain of evidence allows one to trace information from conclusions presented backward to the data gathered and also from the research questions to the concluding points (Yin 2009; Gibbert and Ruigrok 2010). Within this research, this is pursued in the reporting structure of the different research steps for both data collection and analysis. The transparency of these steps is established through the ample reference and explanation of the policy and case study databases, the process of creation thereof, and a detailed citing of interview transcripts and policy document reference. Throughout these steps, and particularly in referencing data derived from interviewees, attention is paid to the researcher’s role (including potential biases) and important ethical considerations.

A brief mention can also be made toward ethical considerations for the issue of **transparency**. This can be interpreted as the degree of understandability results for the ad-

addressees. This is slightly different from how the term transparency is used in the previous paragraphs. Transparency can also be a measure of how well addressees understand results that are presented and how clear the language of these results are. In this case, within the research approach, dissemination was undertaken in several of the case study sites. The dissemination was completed during the running time of the CHANGES project. Part of the purpose of this dissemination was to present results and discuss with addressees, and indeed some of the interviewees, and to ensure an understanding of some of the basic preliminary results. Dissemination materials featuring summaries of these results were also presented and given to the addressees. At least in the case of Poland, these summaries were also translated into the native language. A shorter summary was also provided in Romanian. Presentations were held featuring the preliminary results from multiple cases. In cases in which the presentations themselves were not already translated into the native language, simultaneous translation of the oral presentation component was provided. The focus of these presentations was more on management strategies and practical examples. This allowed a more understandable entry point for the addressees, most of whom were practitioners, administrators, or emergency management officials. Potential points of misunderstanding or lack of clarity were noted and contributed to the understandability and potential presentation of the final results.

2.4 Researcher's role & ethical considerations

Bias

It is acknowledged within this research that in all scientific undertakings, whether qualitative or quantitative, and regardless of the paradigm pursued, it is crucial that the potential bias of the researcher be acknowledged and addressed as this can influence the interpretation and presentation of data (Creswell 2009). The researcher within the case of this research maintains a mostly socio-political science background which may serve the purposes of the policy analysis and the understanding of the risk governance processes well. However, this background is acknowledged as it will undoubtedly provide a different filter during field observations and data analysis than, for instance, a more "physical" scientist. The role of the researcher in the case of this researcher can be considered as an observer and an analyst. Within these roles, particular consideration is paid with respect to the use of human subjects, the participating interviewees. Throughout the writing and dissemination part of the research effort was made to avoid biased language in description of perceptions and to anticipate potential repercussions for individuals interviewed. This was, furthermore, aided by the use of a substantial degree of anonymity in the identification of each of the key informants.

Anonymity & Trust

The interview transcripts were originally coded for use by the researcher using the name of the informant. However, to protect the identity of the interviewees, this coding was reduced to their (basic) affiliation and case study country. With respect to the data collection phase, attention was paid to ensuring that interviewees are not put at risk, and are not told they are at risk. This is particularly important due to the nature of the topic and the fact that most of the key informants reside within hazard prone areas, facing potentially extreme hydro-meteorological risks. Prior to the collection of interview data, letters of purpose and intent sent for requesting interview included the following to ensure clear communication of the research background and intent: the sponsoring institutions and the reference number for the CHANGES project, the reason for the selection of the key informant, the purpose of research and the use of data, a note regarding anonymity, and the names and contact information for questions and follow up. Before the interviews began, the researcher asked for permission to record the conversation and reiterated the purpose of this recording and the intended use of the recorded data. A recording was made whenever permitted. However, in a number of cases this was not permitted or not appropriate. This occurred, for example, in some cases when the interview was conducted within state or military premises that do not permit recording as a general rule.

For the data analysis and interpretation phase, efforts have been made to present the perspectives of the interviewees as truthfully as possible (see previous sections within this chapter on reliability and validity for further elaboration). In the transcription and interpretation of the interview recordings, the original translator (if available) and at the very least a native speaker was consulted in the case of unclear audio and to clarify issues of context wherever they arose in order to help ensure accurate accounting of data.

During the interview process, strategies were pursued to help establish trust and comfortability for the interviewee. These strategies included: tailoring questions at times toward more positive suggestions for proposals to avoid pointing fingers and assigning blame; using a sense of humor as appropriate; receiving the assistance of trusted third parties to act as translator; demonstrating an open mind and communicating that there are no “wrong” or “stupid” answers (Forester 2006).

Listening & Respect

In terms of general good conduct pursued by the researcher, a number of conscious efforts were made to maintain a professional demeanor throughout the research process. This was of particular importance in the interactions with key informants in which the ultimate goal was to treat all interviewees with respect and appreciation for their valuable time and assistance in the research process. Within the dissemination efforts, discretion was provided

in responding to the many questions asked by the interviewees about the other case study sites. Particularly popular was the question of how the interviewee's case compared (fared better or worse) than the other cases. In responding to these questions, again conscious effort was made in providing information that was as accurate and true to the information gathered in the other cases as possible, and with a precautionary note about the differences in context.

This reflects a quote from Forester (2006), in which he refers to Nussbaum 1990, that "In more philosophical terms, doing an interview requires a form of practical rationality, a context-sensitive rationality that's finely aware of details and richly responsible to encompassing histories of obligations and responsibilities (as Martha Nussbaum (1990) might put it)" (Forester 2006, p 148). The quote communicates the level of sensitivity the researcher should maintain, specifically in dealing with potentially sensitive subjects, taking into consideration past experiences (e.g. especially in the case of previous traumatic events), and in maintaining respect for the interviewee's position and responsibilities. This upholding of respect goes hand in hand with critical listening, a highly relevant methodological consideration for policy analysis as well as understanding local context. This is particularly important when investigating preferences, values, and normative interpretations. The researcher can attempt to fit the gravity and tone of the interviewee, demonstrating that the interviewee is being taken seriously and allowing a more equal playing field for the potential co-creation of understanding (Forester 2006). As the research asks rather broad, open ended questions in the interview process (a key characteristic for pursuing exploratory research toward enhancing understanding), value lies also in the information that is given by the interviewees as the interviewee has to an extent self-selected to provide this information. In this way the interviewee provides information that can communicate what is important, what should be (and potentially is not currently) considered, and what the interviewee interprets as well functioning or in need of remediation with respect to management and assessment practices.

In engaging in critical listening, the researcher is also encouraged to maintain a degree of humility. This can also be extremely helpful in the case (as in the case of this research) that the researcher is an outsider with respect to the local community. Humility in this sense can also help the researcher to be more conscious of bias, potentially limiting the influence of this bias in the interpretation of received information (Forester 2006, p 136). Demonstrating humility and responsiveness to the interviewee is an essential component of respect and critical listening. It communicates that the researcher has interest and a potential connection to the interviewee, and that the researcher is not there to "fill out boxes on a clipboard but [rather is there] to show that they 'can relate' to the experience, or at least to this telling of the experience, of the interviewee" (Forester 2006, p 135).

Finally, communicating how this information received from the interviewee will be used and for what purpose is another important detail and contribution to the respect that should be given and maintained. For the research at hand, humility was also considered in the explanation of how the information would be used and its treatment. This was done at the beginning of the interviews and also written with the interview request letters that were sent to potential interviewees.

2.5 Assumptions and limitations

This section includes both theoretical and logistical assumptions. The purpose of this is to understand what is taken as a ‘given’ or a constant within the theoretical underpinnings versus what is logically assumed will occur in order to fulfill the research objectives. The latter is more related to the physical feasibility of the research and is therefore kept separate.

This research makes a few theoretical assumptions in order to limit the scope of the research. The most significant assumption made is that “good” governance principles are inherently beneficial to disaster risk reduction strategies through application to risk assessment, risk management and general risk communication. It is also assumed within this research that risk management and risk assessment are not completely separable entities and that risk communication is a key part to all processes within disaster risk reduction. A further assumption is provided within the notion that risk governance can be assessed through analysis of both the risk culture and the administrative structures which influence and carry out the actions taken and outcomes thereof of disaster risk reduction within the case study areas.

The logistical, or more physical, assumptions relate to the undertaking of fieldwork within each of the case study areas. Interviews were conducted, in large part, as a result of connections made within and from the CHANGES consortium partners and associates who work within the case study sites. The feasibility and scope of the field work was influenced by these connections and as well as through cooperation with local and regional level stakeholders. This also reflects the flexibility that was needed in the data collection and analysis phases as the, particularly primary, data gathered depended in large part on the cooperation with the various levels of stakeholders. There was sufficient time for at least an observational analysis of all case study sites in terms of their physical environment and in attempting to meet the goals of the observational protocol. However, the depth of the analysis within and across the cases is substantially limited by the amount of time that was able to be spent within each of the case study areas. Though representational goals were met, it is important to note that this did indeed affect the extent of the ability

to conduct interviews. This time for depth is one of the main research limitations.

A further limitation that is both logistically and theoretically related is the availability of information in English. Understanding of documents, interview data, and online information only available in the native languages of the case study sites was pursued through personal connections with native speakers and the original translators who assisted in translation of the interviews themselves. Attempting to use and access information in these languages proved challenging and a formidable limitation of the research process, further influencing the potential level of depth in both the individual and (consequently also) the cross-case analysis.

Chapter 3

Background literature

The background literature presented in this chapter provides the reader with necessary information about some of the key concepts as well as important and relevant topics for the research pursuit. The content echoes the main premise of the research and provides support to the assumptions that formulate this premise. As a reminder, the main message and overall premise for the research is that to achieve disaster risk reduction amidst the challenges of a changing environment, a place-based approach is necessary in order to understand contextual factors while at the same time minimizing risk governance deficits and encouraging good governance practices to assist in strengthening communities and their ability to adapt in such an environment. The structure of this chapter, in consequence, follows the different pieces of this assumption.

Before getting to the first content section of this chapter, a brief section of essential terminology is provided to establish a common understanding and introduce the reader to how these terms are used within the research approach. This is deemed essential in guiding the reader through the reiteration and use of these terms in the following subsections.

The next section introduces the reader to the changing environment, particularly in understanding these changes and specifically as they pertain to water-related extremes. This sets up a state of the environment background for the reader and elaborates on how hazards and risks of hydro-meteorological events are changing, including consideration for changes in both physical earth and social systems and their interaction. The section also communicates that these changes are of a highly uncertain nature, but that the potential losses (and from examples of losses in past events) necessitate flexibility of practice and potential update and revision current strategies. The third section delves into the context component and highlights why it is necessary to take a place-based approach in attempting to improve strategies for disaster risk reduction. What is communicated within this section is the need for establishing an understanding of local context in order to develop tailor-made

strategies within a given spatial unit (for example, whether that be for a neighborhood, village, municipality, etc.). This section draws connection to how the spatial context influences the way in which risks are handled and defined and elaborates on components of the context itself touching on characteristics of physical, social, and cultural aspects.

The fourth and fifth sections transition from understanding changes in context to matters of governance within these contexts, and specifically the governance of risks and aspects of “good” governance. The third section focuses on the risk governance perspective, communicating what are the essential processes within risk governance and the connection to how these play out in practice given different social political contexts and value choices. The fourth section discusses, more specifically, the perspective of good governance and good governance principles applied within the governance of risks. The section discusses how good governance has been framed as a requirement for effective risk governance strategies. The research borrows from and utilizes the framework of the International Risk Governance Council, among others, particularly in its use of the concept of risk governance deficits, and elaborates on what have been some reiterated and common examples of the understanding of good governance principles. The section concludes with a brief list of “take-home” points from the literature that summarize some of the main messages of this chapter. These points help transition the reader to the understanding of risk governance operating in the context of changing risks presented in the conceptual framework in Chapter 4.

3.1 Essential key terms

The reader is encouraged to note that many of these essential terms are derived from the fields of natural hazards and disaster risk management (DRM) as well as (in part) from climate change adaptation (CCA). There are major differences and also connecting points between these fields, particularly with respect to the understanding of key terminology. For example, many key differences lie in the terms adaptation, mitigation, and vulnerability. This section attempts to brief the reader on the use of key terminology with respect to these fields as it applies within the thesis.

The list provided is not exhaustive and the reader is encouraged to consult the many terminology and glossary resources from the following for further information (see IPCC 2012; Bobrowsky 2013; UNISDR 2009; IRGC 2006). However, the selected list should provide the reader with necessary insight into the important terms mentioned throughout this chapter.

1. Adaption

Adaptation refers to adjustments in natural or human systems in order to reduce harmful effects or to make use of beneficial opportunities to current or expected climate variation

and climatic change. Adaptation can be automatic or planned, and with respect to natural hazards, includes the ability of humans to respect and understand extreme events within the living environment.

References: UNISDR (2009), Schmidt-Thomé and Juhola (2013), IPCC (2012b)

2. Catchment

Catchment is taken to mean an area of land in which water drains to a common terminus and then connects to another, larger confluence and is taken to be synonymous with the term “sub-basin” as this is still a basin occurring within another, larger river basin.

References: European Environment Agency (2000), US EPA (2016), IPCC (2012), USGS (2016), Official Journal of the European Communities (2000), Official Journal of the European Communities (2007)

3. Climate change

The thesis makes direct use of the definition from the IPCC, which defines climate change as “[a] change in the state of the climate that can be identified (e.g., by using statistical tests) by changes in the mean and/or the variability of its properties and that persists for an extended period, typically decades or longer. Climate change may be due to natural internal processes or external forcings, or to persistent anthropogenic changes in the composition of the atmosphere or in land use” (IPCC 2012c, p 3).

References: IPCC (2012c)

4. Disaster

Disaster is defined as a major disruption or severe alteration in the functions of a community or society that exceeds the abilities of the community or society to cope within its own means. This term is often described as requiring the combination or overlap of a human and hazardous element, and the insufficiency of measures to overcome negative consequences of this combination.

References: IPCC (2012c), UNISDR (2009)

5. Disaster risk reduction (DRR)

Disaster risk reduction refers to the combination of risk reduction and disaster management, addressing the full range of the risk cycle (including prevention, preparedness, response, and recovery). The focus of DRR is on opportunities for abating risks and in reducing vulnerability; and, further, does not assume risks can be completely avoided but draws attention to reducing adverse impacts.

References: Ammann (2013)

6. Extremes (and water-related extremes)

Extreme events include physical phenomena such as heat waves, droughts, floods, landslides, hurricanes, and tornadoes among others. Outcomes of these events are referred to as impacts, which are not considered part of the “extreme event” itself. Water-related extreme events refer to extreme phenomena with a hydrological component and especially those which are induced or at least are attributable to abnormal precipitation patterns, such as the flash flooding and mass movements featured within this thesis. These types of events in the case of abnormally high quantities of precipitation generally include flood (including river, urban, and flash flooding), storm surge, mud flows, debris flows, and landslides; while, abnormally low quantities include drought and subsidence. Single events cannot be directly attributable to anthropogenic climate change.¹

References: NOAA, Lavell et al. (2012)

7. Flood (and flash flood)

A flood is defined broadly by the overflow and or inundation of water covering land that is not normally covered by water. This includes flow from rivers and mountain torrents that are typically characterized as having a relatively high flow that can potentially pose harm to lives and property. A flash flood refers to flooding with rapid (typically within minutes to hours) flow over land, normally induced by heavy precipitation within a short time frame (this also includes sudden release of water from structures such as dams and levees).

References: Official Journal of the European Communities (2007), Hong et al. (2013a), Hong et al. (2013b)

¹ A note on weather and climate: the reader is encouraged to note that both weather and climate affect the conditions for extreme events; with weather described as the atmospheric conditions at a given point in time and climate (very simply) as the average of weather over a certain period of time

8. “Good” governance²

“Good” governance (see first “governance” description below) is the performance of processes of governance that encompasses the rule of law and respect for human rights, ensures administrative transparency and capacity, efficiency and decentralization of resources, as well as citizen participation and non-discrimination (among other commonly noted and key principles).

References: Weiss (2000)

9. Governance

Governance, not to be confused with government, refers (generally) to the processes by which societies and or organizations interact, make decisions, and involve (or not involve) individuals, groups, and other entities.

Reference: Graham et al. (August 2003)

10. Hazard

Hazard is taken to mean an event, processes, substance, phenomenon, situation, or human activity that has the potential to cause harm, such as (but not limited to) loss of life, damage, or disruption to society, the environment, or a particular population. Characteristics of hazards are typically measured and assessed by location, frequency of occurrence, and intensity.

References: Nadim (2013a), UNISDR (2009)

11. Mitigation

Mitigation refers to the planning and implementation of measures to reduce vulnerability, hazard, and exposure of elements at risk in order to lessen or limit potential disaster impact. Measures for disaster risk reduction (both structural and non-structural) are a key part of risk management and include broadly: early warning systems, land use planning, communication, legislation, and physical measures. These measures can also contribute to overall adaptation.

References: Nadim (2013b), UNISDR (2009), IPCC (2012c)

² “Good” governance in this thesis is derived from a primarily western context.

12. Policy

Policy is defined as the product of ongoing discursive and often complex processes in framing problems, understanding issues and meanings, and the creation and implementation of actions and measures.

References: Brugha and Varvasovszky (2000), Fischer and Gottweis (2012), Galperin and Wilkinson (2015)

13. Risk

Risk refers to the product of the probability of the occurrence of a (or multiple) hazard(s) and the vulnerability of exposed elements or systems. Risk is, therefore, “linked to the potential occurrence of negative consequences, in terms of physical, social, economic, and environmental losses, in a given area over a period of time, resulting from interactions between physical events and vulnerable conditions of a society or socio-ecological system.” (Birkmann 2013, p 856).

References: Birkmann (2013), UNISDR (2009)

14. Risk assessment

Risk assessment is considered to be a process of understanding and assessing the nature of risk as well as determining its extent and characterization. The process of risk assessment typically includes: identifying uncertainties and exposed elements; characteristics of exposed elements; characteristics of the potential hazard(s) including localization, intensity, and probability and frequency; and “the analysis of exposure and vulnerability including the physical, social, health, economical, environmental, and perception dimensions and the assessment of the coping capacities to likely scenarios of occurrence” (Lacasse 2013, p 862).

References: IRGC (2006), Lacasse (2013)

15. Risk culture

Risk culture is a central tenet within the research analysis and is defined within this research as the combination of the beliefs, norms, traditions, and values that influence and give meaning to the behavior of individuals, communities and organizations toward risk and risk decision-making

References: Assmuth et al. (2010), Little (1991), Renn and Walker (2008)

16. Risk communication

Risk communication is defined as the provision or exchange of information regarding risks and hazards to a given individual, public, organization, or society. Provision implies a unilateral transfer of information (one-way), while exchange tends to imply bilateral (two-way) means of communication.

References: IRGC (2006), Lindell (2013)

17. Risk management

Risk management is a process involving the consideration of a myriad of factors including political, social, economic, and cultural as well as technical hazard information in order to understand threats, vulnerability, and the potential coping capacity of a given community. The purpose of which is to derive and develop strategies to address these threats, build capacities, and reduce future risk.

References: IRGC (2006), Nirumpama (2013)

18. Risk governance

The definition of risk governance is taken from the International Risk Governance Council (the IRGC), which defines risk governance as “the totality of actors, rules, conventions, processes, and mechanisms concerned with how relevant risk information is collected, analysed, and communicated, and how regulatory decisions are taken” (IRGC 2006, p 22).

References: IRGC (2006)

19. Stakeholder (and actor)

Stakeholder is defined as an individual, group, or organization that has an “interest in a project or entity, or would be affected by a particular action or policy” (Baede et al. 2007, p 87). An actor is defined as an individual, group, or organization that is able to influence and have decision-making powers, “whose choices will ultimately determine the [decision-making] outcome. ” (Scharpf 1997, p 43). An actor can also have a “stake” and be considered a stakeholder; however, a stakeholder is not necessarily always an actor.

References: Baede et al. (2007), Brugha and Varvasovszky (2000), Scharpf (1997)

20. Strategy

The definition of strategy borrows from the understanding within managerial and futures fields and is defined as organizational processes set up or employed toward a desired future state or goal, which assists in determining which policy to develop and which actions to take.

References: Evered (1983)

21. Vulnerability

Vulnerability is defined very generally as the potential for damage, harm, or loss. This potential refers to “[t]he characteristics and circumstances of a community, system or asset that make it susceptible to the damaging effects of a hazard”, which can vary within a community as well as over different periods of time (UNISDR 2009, p 30). Vulnerability, furthermore, “includes both the exposure from the physical system, and the social response and how these are produced locally to create hazardousness of places” (Cutter 2013, p 1089).

References: Cutter (2013), UNISDR (2009)

22. Resilience

Resilience refers to the ability of a community, system, or society to recover from a shock or stressor, such as a hazardous event, and maintain its basic functions. Resilience is dependent upon the "degree to which the community has the necessary resources and is capable of organizing itself both prior to and during times of need" (UNISDR 2009, p 22).

References: UNISDR (2009)

3.2 The changing environment: uncertainty in physical changes and extreme weather

The main message of this section is that strategies pursued toward disaster risk reduction must overcome challenges posed by changing hydro-environments. In general, this research, and indeed the project in which it is conducted, exists in recognition of the ongoing changes taking place within the field of natural hazards research especially in connection to an increasingly uncertain and ever changing climate. The research does not delve into or take sides as to the extent of estimated changes, but acknowledges that changes to the earth’s climate are currently taking place and that it is not possible to precisely predict the extent of these changes. The research further acknowledges the work of previous research in establishing estimates and the scientific evidence which supports the argument that societies must become more resilient to negative consequences of potential changes and especially the changes which may contribute to an increase in the temporal and spatial frequency and intensity of extreme weather events, especially in terms of the intensity, duration, and localization of precipitation and changes in temperature. The most recent report from the Intergovernmental Panel on Climate Change (IPCC), the Special Report on Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation (SREX), lends credence to this proposition.

3.2.1 Physical changes and extreme weather

In highlighting the potential physical changes, the report upholds that “[a] changing climate leads to changes in the frequency, intensity, spatial extent, duration, and timing of extreme weather and climate events, and can result in unprecedented extreme weather and climate events” (IPCC 2012c, p 5). This statement comes with the caveat that there is limited evidence in the ability to estimate changes in regional scale flooding in consideration of both frequency and magnitude of flooding events. The report states that the overall frequency of heavy precipitation is likely to increase in the 21st century, with likely referring to a 66 to 100% probability (IPCC 2012c, p 11; IPCC 2012b, p 2). With respect to the influence of changes in precipitation and temperature on possible changes in floods, the report states that there is low confidence for projecting changes for fluvial flooding but that this low confidence is a result of the complexity in determining causes for regional and local level variability. However, the report further states with medium confidence that some catchments or regions may experience increases in local flooding as a result of heavy rainfall (IPCC 2012b). In consideration of this, connection is drawn to further statements from the report with respect to landslides in that “[t]here is high confidence that changes in heat waves, glacial retreat, and/or permafrost degradation will affect high mountain phenomena such as slope instabilities, movements of mass, and glacial lake outburst floods” and that “[t]here is also high confidence that changes in heavy precipitation will affect landslides in some regions” (IPCC 2012c, p 13).³ This quote also encapsulates the complexity of the variables for spatial variation in the potential impacts of changing hydro-meteorological risks, particularly for mountainous areas such as the CHANGES project case study sites presented in this research located in the Alps and the Carpathian Mountains.

In the past two decades, it has been further argued that changes in natural hazards and consequential disasters are largely due to meteorological and hydrological events, and that there has been substantial variation in these events (Birkmann and von Teichman 2010). One example can be found in that “[h]ydro-meteorological disasters increased by more than 100%, from about 100 in 2004 to more than 200 in 2006,” (Birkmann and von Teichman 2010, p 171). Given the expected changes and variation in temperature and rainfall patterns, one must also consider the impact not only on the physical environment but on affects to human livelihoods that could occur over the next century (Schipper and Pelling 2006). Specific to the European context, the European Forum for Disaster Risk Reduction (EFDRR) considers these potential affects within the following statement:

³Levels of confidence are determined by “the validity of findings in relative terms (such as “low,” “medium,” and “high”), based on the assessment of underlying scientific evidence and agreement” (IPCC 2012b, p 13).

In Europe most of the economic and human losses are due to weather-related disasters such as floods and storms. This is a concern for the future since, as highlighted by the IPCC 4th Assessment Report, the impact of climate change is likely to increase the severity and frequency of weather-related hazards with negative consequences especially impacts on livelihoods and the environment (EFDRR 2011, p 5).

This statement complements the results of the International Workshop on Climate Change Impacts and Adaptation: Reducing Water-Related Risks in Europe, which state that the variation of patterns displayed within the hydrological cycle influenced by climate change have been linked to changes in extremes, such as floods and droughts. The results go on to assert that this can lead to negative consequences for ecosystems, human health, and can adversely impact water systems, especially the reliability and costs of operating systems (paraphrased from Quevauviller et al. 2010, p 7). With respect to extremes in the European context, the United Nations Office for Disaster Risk Reduction (UNISDR 2008) further emphasizes that Europe faces the possibility of increased flood risk and especially risk to flash flooding (UNISDR 2008). Several examples of the outcome of these risks can be found in recent events including those found in Table 3.1 (Barredo 2007; Bissolli et al. 2011; Guha-Sapir et al. 2016).

These events demonstrate that even within the last two decades water-related extremes, specifically flooding, affects a wide range of the European continent. This has also been communicated within the work of Biesbroek et al. (2010), who state that “The impacts of changes in current climate have been well documented and a growing body of scientific studies anticipate that nearly all European regions will be affected by future impacts of climate change” and that “[t]hese impacts will be unevenly distributed over European regions and climate-sensitive sectors and will put additional pressures on the existing social-ecological structures and functions” (Biesbroek et al. 2010, p 440).

The complexity, widespread impact, and variability voiced within these statements has been supported, furthermore, by the work of the European Spatial Planning Observation Network (ESPON) with their report on Climate Change and Territorial Effects on Regions and Local Economies. The report communicates that there are complex, multiple levels of variability of climate change impacts across European regions and that “the severity of its impacts varies in different regions and for different economic sectors and social groups” (ESPON Climate 2011, p 196). The evidence provided in estimating the distribution of these impacts supports how consequences within and across regions are a function of the dynamics of a changing human environment in combination with changing climate and weather patterns. This can be seen, for example, in “the increases in losses from weather

Year	Flood Event Location (attribute)
2000	<ul style="list-style-type: none"> • Areas of England and Wales (historically heavy rain) • Alpine areas (France, Switzerland, Italy) (excessive regional rain) • Piedmont, Valle d'Aosta and Liguria Regions (Italy) (excessive regional rain) • Additionally affected countries: Croatia, Czech Republic, Greece, Hungary, Italy, Norway, Romania, Spain, Slovakia, Portugal, Poland
2001	<ul style="list-style-type: none"> • Wisla River (Poland) (torrential rain + dyke failure) • Additionally affected countries: Croatia, France, Greece, Hungary, Italy, Norway, Poland, Portugal, Romania, Slovakia, United Kingdom, Belgium, Austria
2002	<ul style="list-style-type: none"> • Rhône River (France) (heavy rainfall) • Elbe River, State of Saxony, Dresden (Germany) (two periods intense rainfall) • Moldau (Vltava) and Elbe (Labe) Rivers, Prague (Czech Republic) (two periods intense rainfall) • Salzburg, and other areas (Austria) (excessive regional rain) • Additionally affected countries: Slovakia, Spain, Sweden, Romania, Portugal, Poland, the Netherlands, Italy, Ireland, Hungary, Greece, Denmark, Belgium, Bulgaria, Austria
2003	<ul style="list-style-type: none"> • Udine Province (Italy) (heavy rainfall) • Rhône River (France) (wind + heavy rainfall over 3 days) • Additionally affected countries: United Kingdom, Sweden, Spain, Slovenia, Slovakia, Romania, Portugal, the Netherlands, Greece, Germany, Croatia, Austria, Belgium
2004	<ul style="list-style-type: none"> • Boscastle, Tintagel and Camelford (UK) (storms) • Additionally affected countries: Spain, Romania, Portugal, Poland, Italy, France, Germany
2005	<ul style="list-style-type: none"> • Voralberg, Tyrol, Styria, Carinthia (Austria) (heavy regional rains) • Bavaria State (Germany) (heavy regional rains) • Switzerland (heavy regional rains) • Additionally affected countries: Spain, Slovenia, Slovakia, Romania, Portugal, Poland, the Netherlands, Italy, France, Denmark, Croatia, Belgium
2006-2010	<ul style="list-style-type: none"> • 2010 Severe flooding in eastern central Europe including Poland, Czech Republic, Slovakia, Hungary, Croatia, Bosnia and Herzegovina, Bulgaria, and south and eastern Germany (heavy rainfall)

Table 3.1: Flooding examples in Europe from 2000-2010, derived from Barredo (2007), (Bissolli et al. 2011) and (Guha-Sapir et al. 2016). Note: presented list is not exhaustive.

related disasters [that] have been caused by increased exposure, as growing numbers of people and amounts of capital are located in areas that are at risk from natural hazards” and that this has been argued to be influenced by “the frequency and/or severity of extreme weather events” (Bouwer et al. 2007, p 3). This highlights that there are shifts in not only physical elements (i.e. frequency and intensity of events at varying degrees of certainty) but also changes associated with social, economic, demographic, and cultural factors, including and especially concerning factors which influence decision-making (such as where to locate residential areas, industrial facilities, services of public interest, etc.).

According to the European Environment Agency (EEA), “[c]limate change is strongly intertwined with other socio-economic changes” with examples such as demographic trends, urbanization, and competing demands for resources and further states that “[u]rbanisation also reduces the area available for natural flood management or increases the number of homes and businesses actually in flood-prone areas” (European Environment Agency 2012, p 6). The EEA connects socio-economic changes to increased “vulnerability of people, property and ecosystems under current climate conditions in the case that efforts toward adaptation are not pursued” (European Environment Agency 2012, p 6). Change in human settlement patterns are subject to changing trends in land use and urban design and are among other social, and specifically spatial factors, acting in parallel and interconnecting to climatic changes and the potential impacts of extreme events (National Research Council of the National Academies 2006). This overlap between human and natural environmental components sets the foundation for potential disaster losses. This is expressed well within the IPCC SREX report in that “[e]conomic losses from weather- and climate-related disasters have been heavily influenced by increasing exposure of people and economic assets.” (IPCC 2012b, p 2).⁴ This draws attention to the negative consequences of the overlap and the importance of the human elements involved in these outcomes.

With respect to disaster losses, economic losses have increased. However, similarly to the estimated changes in climatic as well as weather patterns, these losses largely vary both spatially and in year to year variability (IPCC 2012c). There has been an increase in event frequency, loss, and territories affected by weather-related disaster risk (UN 2009). Examples given by previous United Nations Global Assessment Reports on Disaster Risk Reduction provide evidence that risk has recently been increasing, considering that globally, from 1990 to 2007:

- Mortality to floods increase of 13%
- Economic loss due to flooding increase of 35%
- Number of people exposed to flooding increase of 28%
- Exposed GDP increase 98% (UN 2009, p 8)⁵

The most recent Global Assessment Report (2015) states that flooding in Central Europe in May and June of 2013, provided some of the largest economic disaster impacts with 22 billion USD estimated in total losses (UN 2015). To give an idea of the extent of losses outside of purely economic loss, according to the Annual Disaster Statistical Review (ADSR) of 2011, 55% of disaster victims within Europe in 2011 were a result of hydrological disasters (1.7% meteorological and 0.1% stated as climatological) and 43.2% from geophysical disasters (Guha-Sapir et al. 2012, pp 31-32). In looking at the ADSR of 2014,

⁴ Stated within the report as having “high confidence” (IPCC 2012b).

⁵ Given in absolute terms and in keeping hazard levels constant.

“the number of hydrological disasters (29) was the fourth highest since 2004 and showed a 45% increase compared to its decennial average” (Guha-Sapir et al. 2015, p 31). The year 2014 also marked an increase in the total number of victims in comparison to the previous decade, although this is a result of the general increase in the overall number of these disasters. Flooding in Europe appeared to take the largest toll on disaster victims with a share of 93%, which is influenced by flooding in Serbia (1.6 million victims) and Bosnia-Herzegovina (1 million victims) (Guha-Sapir et al. 2015, p 31). While these numbers provide large-scale representations, with respect to losses, an important note should be made about the relativity of impact at more local levels in terms of number of victims. For example, in a community of 100 people, losing two lives such as in the case of the Italian case study area of the CHANGES project presented in this research has a very profound effect on this community. Investment in protecting against these losses, has been reiterated to outweigh substantially high costs in the future, especially for reconstruction and potential loss of life (see UN 2009; Schipper and Pelling 2006; EEA 2012; ESPON Climate 2011).

3.2.2 Changes and uncertainty

The action of prior investment is made even more crucial given the inherent uncertainty of potential losses. As de Vries (2010) states, not only is the variety of impacts a concern, but so is “the uncertainty about the magnitude of climate change, the difficulty to predict its consequences (when and where), the extent to which humankind is able to affect climate change processes, and the long-term process which is at stake (decades to centuries)” (de Vries 2010, p 825). This difficulty to predict extends also to the inability to attribute individual events to climate change, which is a nearly impossible feat given the complexity of influential factors at work and how these factors equate to potential disaster loss (Birkmann and von Teichman 2010). As a consequence of this complexity, risks are often non-simple, do not conform to administrative or political borders, and seldom fit to any linear and calculable model (van Asselt and Renn 2011). This is in large part due to the uncertainty of risk which remains even within the technocratic efforts to manage risks that tend to assume calculability.

This uncertainty extends especially within the context of changing hydro-meteorological hazards where, as according to the 2015 Global Assessment Report, historical events may no longer be an applicable base for future estimations; and even probabilistic models still retain levels of inherent uncertainty (UN 2015). Particularly within the scope of models and estimations of future change, an important notion must be reiterative that “all laws or theories [should be considered] as *hypothetical or conjectural*; that is, as guesses” (Popper 1972, p 9, original emphasis). One must acknowledge, therefore, that there is no absolute

with respect to laws and theories in the calculation of potential climatic changes and the risks of adverse impacts. Uncertainty is therefore two-fold in that: 1) current theories are not absolute, and 2) future theories will have difficulty using current theories as a solid baseline due to changing climatic circumstances. The complexity of change, and the difficulty in estimating uncertainties supports the assertion that it is not possible to reduce risk to a view limited to probability, intensity, and scope of possible harm (Beck 2006, p 333). Complexity in parameters for climatic, and also social change, must be considered, particularly in light of the fact that "[c]limate change will have widely differing regional manifestations by virtue of climatic variations specific to a region, sensitivities differentiated by region and sector and a differentiated capacity to adapt to climate variations" (Greiving et al. 2015, p 311). Variability and uncertainty, therefore, arguably necessitate equal weight of the more social phenomenon and efforts to ensure greater flexibility in strategy development and implementation. This calls for an understanding of local context and particularly social characteristics of place – the subject of the next section of this chapter.

3.3 Context and the spatial perspective

The importance of a spatial perspective, and the consequential necessity of taking a place-based approach, has also been communicated by the IPCC with robust evidence and high agreement. The SREX report states that "[r]isk management works best when tailored to local circumstances" and that "[c]ombining local knowledge with additional scientific and technical expertise helps communities reduce their risk and adapt to climate change" (IPCC 2012b, p 3). Attention to local circumstance is also crucial given the variation in possible impacts of climate change and its potential contribution to changing patterns of local hazardous phenomena, particularly those pertaining to water-related extreme events.

3.3.1 Regional variation

Within Europe, evidence from the ESPON Climate project indicates that regions are not and will not be equally affected by climate change and further emphasizes the need for adaptation in particular to take a "place-based approach" to better address spatial variation (ESPO Climate 2011). Areas to be targeted seem to be very much related to development, as regions typically identified as less developed do not have effective water management systems. The greatest importance for implementing specific measures was found in "water management, preservation of water, forest fire forecasts, preparation for heat waves and regulation of land use" (ESPO Climate 2011, p 199). With respect to specific regions, areas including the Northern Sea, North-Western European and Atlantic coastal regions as well as Alpine areas, consideration of greatest impacts to these regions

requires strategies that especially address natural disasters, explicitly those involving flooding and coastal storm hazards (ESPON Climate 2011).

In a report commissioned by the Netherlands Environmental Assessment Agency, Massey and Bergsma (2008) provides additional evidence as to the differences in impact across Europe but specifically targets the objectives of adaptation policies. In relation to the regions applicable within the cases presented in this thesis, the study indicated that in Alpine regions (including the Italian and French cases) objectives generally focus on landscape and water management as the most important topics, followed by biodiversity and food security (Massey and Bergsma 2008, p 218). For the Tatra and Carpathian regions (including the Romanian and Polish cases), the focus was directed first toward food production and security, and then water management (Massey and Bergsma 2008, p 218). Mountain areas are also explicitly addressed by the ESPON climate project. In utilizing evidence in view of the thesis cases, one should note the potentially greater (and potentially more adverse) impacts to areas that have limited accessibility as well as those areas which are (at least within the Alpine cases presented in this thesis) also sparsely populated and, consequently, have low capacity to adapt. These areas, and especially the Alpine areas, also rely heavily on tourism, which is stated to be a sector that can be highly impacted and makes up a substantial part of the economy of some local areas with low adaptive capacity (ESPON Climate 2011).

3.3.2 Local variation and spatial context

Evidence of change and variation within and across regions found within the above studies is found also in the work of Susan Cutter and colleagues (see Cutter 1996; Cutter et al. 2003; Cutter and Finch 2008, among others) and provides strong argumentation for the spatial dimension of the research taken in this thesis through a place-based approach (i.e. via analysis and comparison of local case studies). Due to the temporal and spatial distribution of changes (including anticipated climatic, ongoing environmental, and human environmental changes), tailor-made approaches that take local context into consideration are needed in order to create suggestions for strategies and improvements. This is supporting by Cutter and Finch (2008) in the following statement:

The temporal and spatial changes in social vulnerability based on our historic assessments suggest that for future preparedness, response, recovery, and mitigation planning, a one-size-fits-all approach may be ineffective in reducing social vulnerability or improving local resilience to the impacts of hazards. Instead, a more flexible approach that nests place-specific local variability within the broader federal policy guidelines and frameworks is suggested (Cutter and Finch 2008, p 2305)

The recognition and importance of the spatial dimension is considered a crucial part of understanding societal problems, as most are comprised or connected to some geographic component either in cause or in developing a strategy towards finding a solution (Jakle et al. 1976). These problems can span from within housing and health sectors to economic and environmental sectors and require consideration of spatially focused policies, although decision-makers are not always aware of the need for taking this consideration in order to develop relevant solutions (Jakle et al. 1976). Attention to this dimension and the need for flexibility given inherent and increasing variability, also harkens to the complexity of place and the spatial heterogeneity in Crawford Holling's "spatial mosaic" (see Holling 1973; Holling and Goldberg 1971). Although the concept originated within the study of ecological systems, it has been linked to planning disciplines stressing "that the natural world is not very homogeneous over space... but consists of a mosaic of spatial elements with distinct biological, physical, and chemical characteristics" (Holling 1973, p 16). The concept refers to a more realistic understanding of the nature of space and the many factors at work, including unexpected events, which occur over time and add to this heterogeneity (Holling 1973). This is therefore a highly applicable concept in the topic of unexpected and extreme events in a given, already dynamic spatial environment and the risks posed by such events.

Hazards of place and social vulnerability

In view of the above considerations and with respect to the ability to address risk for a given place, Susan Cutter's "hazards of place model of vulnerability" is an important and informative framework. Regarding the spatial dimension of vulnerability, in applying this framework it should be acknowledged that there are both spatial and non-spatial parameters that contribute to potential harm and that societal vulnerability (referring to a social group or society as opposed to the individual) "has distinct spatial outcomes and varies over time" (Cutter 1996, p 530). The parameters contributing to social vulnerability are often attributable to "underlying social conditions" (Cutter 1996, p 543) and to place inequalities, including "characteristics of communities and the built environment, such as the level of urbanization, growth rates, and economic vitality" (Cutter et al. 2003, p 243). Thus, place, as the focal point for the unit of analysis, is appropriate and features as a central piece in the hazards of place model.

This model was inspired from the previous work of Hewitt and Burton (1971) and their "all-hazards-at-a-place research design", which considered the combination "of the physical event itself and of the state of human society, including specifically the adjustments adopted to cope with the hazard and the state of preparedness" (Hewitt and Burton 1971, p 5). In explaining the "hazards of place model of vulnerability" (see Figure 3.1, hazard potential is

the product of the risk and the mitigative efforts to reduce impacts of risk. (Cutter et al. 2003), further elaborate in describing the model that:

The hazard potential is either moderated or enhanced by a geographic filter (site and situation of the place, proximity) as well as the social fabric of the place. The social fabric includes community experience with hazards, and community ability to respond to, cope with, recover from, and adapt to hazards, which in turn are influenced by economic, demographic, and housing characteristics. The social and biophysical vulnerabilities interact to produce the overall place vulnerability (Cutter et al. 2003, p 243).

The model places specific focus on locality and stresses that place is considered the main unit of analysis (Cutter 1996).

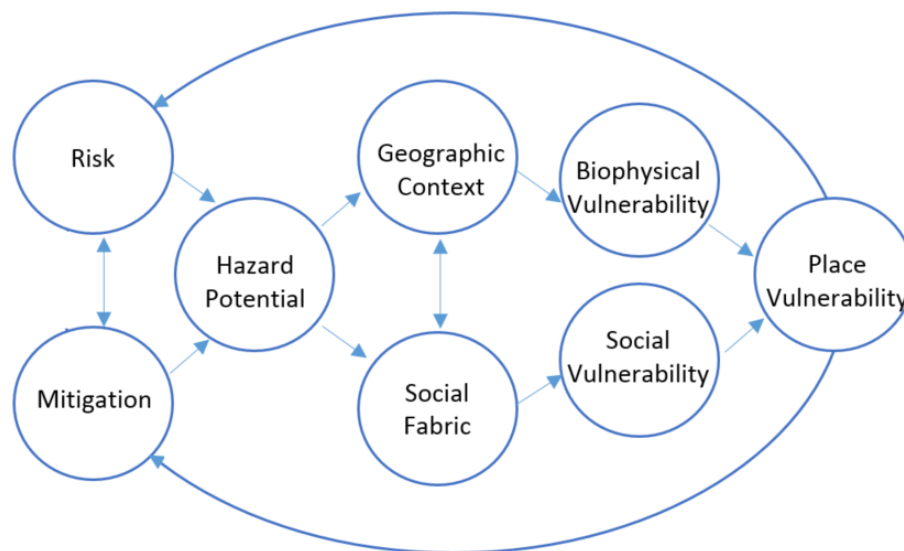


Figure 3.1: Hazards of place model of vulnerability, recreated and slightly altered from Cutter (1996, p 536)

The model further visualizes feedback loops connecting place vulnerability to mitigation and risk, acting as either an enhancement or detracting from one or the other. It also communicates a combination of both social and (as stated within the model) biophysical and technological vulnerability that produce the overall place vulnerability (Cutter 1996). These components have been considered and have played an important role in the shaping of the conceptual framework for this thesis (please see Chapter 4). According to Cutter and Finch (2008), using place to encourage a more local level focus assists in developing “an understanding of those places that are experiencing significant changes in their social vulnerability and show how such changes might influence emergency preparedness and response in the future” (Cutter and Finch 2008, p 2303). Some examples of factors influencing social vulnerability include: limited political power and lack of resources, building

material, individuals with physical disabilities, density of infrastructure, as well as housing type and construction quality, among others (paraphrased Cutter et al. 2003, p 245-249).

These factors also highlight the diversity of potential social vulnerability and support the reiterated need for non-homogenous risk assessments and management strategies that encompass the diverse range of perceptions in a community at risk (Mercer et al. 2012). This requires a change from what Mercer (2012) states is the “[t]raditionally, . . . top-down authoritative approach to DRR [that] is favoured, in which solutions to natural hazards are often developed outside the specific context to which they will be applied” (Mercer 2012, p 97). These approaches that are formulated from outside local context, for example national level policy created in accord with the Hyogo Framework for Action, have not seen a trickle-down effect to local level, at risk communities, and would benefit from integrating knowledge from these local communities to avoid a propensity to failure in implementation (Mercer et al. 2012).⁶

Recognizing issues with top-down focus, and a need for understanding the local, diverse, and ever changing spatial context point to a further need to understand governance and the processes involved in the governance of risks taking place within these contexts. This is important as the variation of different actors and groups involved with and affected by risks is influenced by the spatial scale of analysis (Adger et al. 2005), understanding through whom and through which means successful implementations of strategies can be realized.

3.4 Governance and the ‘risk’ governance approach

Governance is here briefly described before discussion of the concept of risk governance following this section. The term governance is considered within this document to be comprised of the institutions, political structures, and all actors within both vertical and horizontal dimensions involved in decision-making processes and the communication processes used therein. Governance therefore accounts for not just the more tangible aspects of governmental (or legal administrative) structures but also the socio-cultural factors which influence the decisions made by the actors within these structures. The government versus governance argument is based on the distinction between structure and process where government is described as the physical structure of legal institutions while governance is described as the political process (Rose 1973). Within the literature, there is a

⁶ One common example can be found in the relocation of communities, which is often a process conducted with limited consultation with the communities themselves, resulting in failure. Relocation programs could greatly benefit from hazard mapping and communication of results with community groups for “decisions on whether to relocate or not, or to carry out very local changes in land use to minimize risk while minimizing disruption to the communities concerned” (Mercer et al. 2012, p 90).

wide variety of how the term governance is applied which includes for example sustainable governance, global (or world) governance, corporate governance, water governance, participatory governance, and climate governance among many others. This term has come into the international research community most recognizably in the 1980s within the field of development and has been growing in popularity (van Asselt and Renn 2011). The term has been described both as descriptive (where it is used to understand a policy domain or state of affairs within a web of actor interactions) and as normative (where it is used as a “model or framework for organizing or managing society”) (van Asselt and Renn 2011, p 435). Though the concept of governance can be interpreted as one or the other of these descriptions, this research agrees with the assertions made by van Asselt and Renn (2011) in which use of both descriptive and normative is most appropriate for risk governance. This permits use of an overall framework with which to consider the policy surrounding risk and its respective actors.

The many actors involved in decision-making processes can be, and are commonly, ascribed to three categories; state (within the government structures), civil (within the public sphere), and market (within the private sphere). Figure 3.2 provides a visual depiction of these spheres and their potential for overlap.

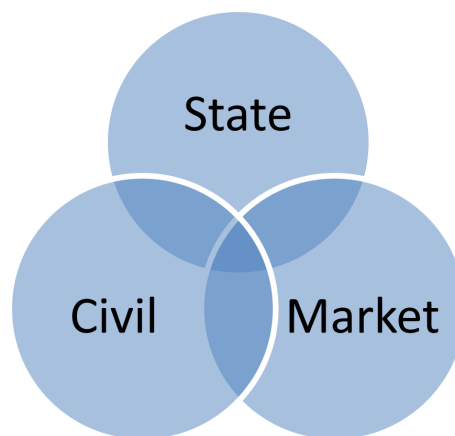


Figure 3.2: The three spheres of actors in decision-making processes. The figure is widely acknowledged and used to show the differentiation between the government, civil public and private spheres influencing decision-making processes.

These actors are more broadly categorized as lying within a given vertical and horizontal level of governance. The a horizontal level includes entities which interact within the same social, political or administrative level (i.e. cross-sectoral) while vertical implies that these interactions occur across different social, political or administrative scales (i.e. top-down and bottom-up approaches) (Young 2002). The horizontal dimension has also been described as the different individual levels such as a community (local), region, or nation and the vertical as the links between these levels, which enables (when multiple levels are

linked) the concept of multi-level governance (van Asselt and Renn 2011). The existence of a myriad of actors at multiple levels indicates the need for clear assignment of responsibility. Particularly in regard to the present topic, issues arise regarding administrative responsibilities and who has these with respect to handling hazards and risks (Birkmann 2006a). It is argued by Steinfuehrer et al. (2011) that “[u]nderstanding the different levels and scales of governance, as well as defining who governs what, is critical in the development of future management strategies of natural hazards” (Steinfuehrer et al. 2011, p 5). Attempts to establish this understanding greatly benefit from comprehension of the problems of fit, interplay and scale presented by (Young 2002), which describe:

... the (mis)match between properties of biogeophysical systems and attributes of institutions, on interactions between and among distinct institutions, and on the prospects for scaling up or down in the dimensions of space and time in our efforts to understand the roles that institutions play in causing and confronting environmental change (Young 2002, pp xiv-xv).⁷

A problem of *fit* with respect to the above occurs when institutional arrangements work well to solve problems within one context but are incompatible and ultimately fail when applied to another, which causes what is termed a “mismatch” and is often resistant to change (Young 2002). The logic follows that the closer in *fit*, the better these arrangements (or one can replace this with strategies) will perform. Interplay, or interactions between institutions, operates within both the previously mentioned vertical and horizontal dimensions and can generate interdependencies over time and with repeated interaction (Young 2002). Scale is determined as both spatial and temporal and is more directly linked to the vertical dimension of governance where it is assumed that differences between, for example, the local, national, and international levels, are significant when determining cross-case comparability (Young 2002). These three, and particularly that of fit, consider also the context specificity of actors and institutions within the different dimensions of governance. Interactions of actors within specific contexts are dependent upon the methods of communication and overall culture of a given society.

3.4.1 Governance of risks in a changing context

One of the few tenets that can be held constant and must be communicated within changing risks is that risks cannot be completely eliminated. Challenges posed by risks are changing as are the patterns of vulnerability. Current approaches to reduce risks are limited as are the abilities to understand and predict them. It must be reiterated that this amounts to greater uncertainty as, according to Walker et al. (2010) of the CapHaz-Net Consortium,

⁷ Institutions within this research design follow the definition provided in Young (2002) for the *thick institution description*, which includes social practices based on sets of rules, procedures and programs.

“risks are perceived to be more uncertain than previously thought and modern society appears to be increasingly intolerant towards the impacts of hazards and our apparent inability to cope with risks of various forms” (Walker et al. 2010, p 6). It is argued that, faced with uncertainty and challenges posed in increasing disaster risk, solutions might be applied through a risk governance framework and efforts to improve risk governance strategies (Walker et al. 2010; UN 2009). It is important within this discussion to state that the changes to be addressed through the risk governance framework encompass not only physical changes, such as the spatial and temporal distribution of changing hazards, but also societal changes. Furthermore, the way societies view risks is changing (Beck 1994; Bulkeley 2001) as well as the characteristics that form the spatial identity of the societies themselves, which includes factors such as demographic and economic characteristics which impact a region’s vulnerability to climatic changes (ESPON Climate 2011). Societal changes include that which alters the current system of governance within a given community and provides a significant impact on how reducing risk is addressed. Physical changes in the hazardous event in combination with societal changes and with the perception of risks and changing vulnerabilities require changes in extant DDR strategies. This process is visualized by Walker et al. (2010) in Figure 3.3.

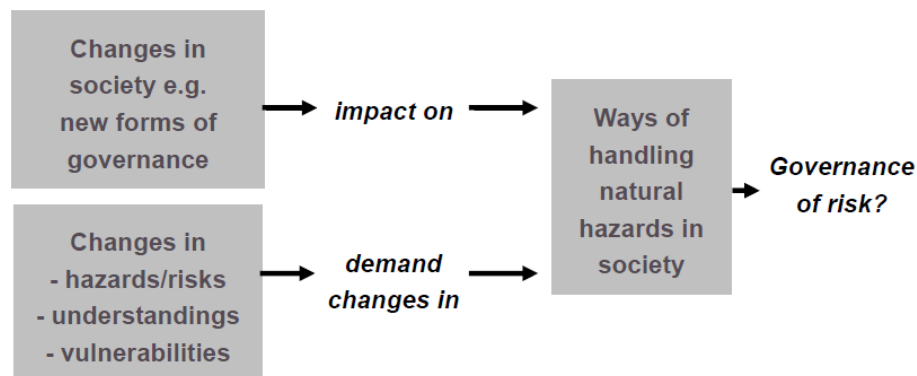


Figure 3.3: Rationale for risk governance. This figure is provided by Walker et al. (2010) of the CapHaz-Net Consortium. The figure illustrates the rationale for the need to consider the risk governance framework with respect to how a given society can address natural hazards (Walker et al. 2010, p 6).

Risk governance is also considered a useful way in which to handle disaster risks as it is stressed that the need for addressing these changes occurs at multiple levels of governance within a given society. It is stated that there is a need for more integration between vertical scales of governance (national, sub-national, and local) for disaster risk management and that there is potential for all levels to derive benefit through development policies as well as practice (IPCC 2012c). Considering the different levels within risk governance allows for an integrated approach and taking into account the need to improve management of risks at all levels particularly with respect to policy development (Schmidt-Thomé and Greiving

2008). This is particularly pertinent as a purely top-down approach, does not equate to implementation at lower levels (IPCC 2012c).

An important part of what the risk governance framework offers in the effort toward risk reduction is the core component of risk communication as one of the three primary components of risk governance: risk assessment, risk management, and risk communication (IRGC 2006).⁸ Effective risk communication when applied at the local level encourages integration of local level knowledge and reflects the current shift in the approach to governance within western societies. This shift, to refer to the explanation provided by Rhodes (1997), refers to what is considered “new governance” where the state is neither the primary nor the only actor in decision-making and where there is involvement of a “multiplicity of actors specific to each policy area” (Rhodes 1997, p 51). The public, as an actor among this multiplicity, is growing in importance with respect to the need for integrating local knowledge, the need for understanding risk perception, and establishing legitimacy of actions taken to reduce risk. The significance of this actor implies the need within risk governance strategies to ask the question, especially amidst the background of uncertainties within scientific spheres, “who believes there to be a risk, and why?” (Beck 2006). This is and will be an important consideration for how future challenges and changes of current risk reduction strategies will be addressed especially considering efforts to maintain public confidence in the strategic decisions.

Taking into account the above shift in the actors at play along with the need for integration and consideration of all levels of governance is of particular importance for the European Union. This is due to the EU’s diverse yet unified legislative processes which are developed and generated from supranational, national, sub-national and down to local levels. Governance of risks and strategies thereof vary within and among the Member States and from region to region (Assmuth et al. 2010). There exists diversity in the various forms of governance between states and one must be cautious in overgeneralizing risk governance strategies as variations occur within, for example, socio-cultural factors, the role of the citizen (the public) and the appropriate administrative levels for effective risk management (Walker et al. 2010). The complexity and uncertainty of changing risks creates challenges for diverse strategies employed to address risk reduction at multiple levels within the EU. As stated within the description visualized by Figure 3.3, the use of a risk governance framework permits a framework in which to address these challenges.

⁸ These are explained in more detail within the next sub-sections.

3.4.2 A brief introduction to risk

Risk

The concept of risk has undergone a transition from what has been and is traditionally considered as a calculable entity to that which is also something perceived by individuals and communities facing risk. The traditional understanding is that risk serves as a measure of the probability of a particular hazard and the vulnerability of that which is exposed to this hazard. This is typically represented by a form of the following equation:

$$R(\text{risk}) = H(\text{hazard}) \times V(\text{vulnerability})$$

The above is the common, simple version of many other variations of this equation found within the literature which include aspects of value, management and varying forms of vulnerability including social, political, institutional, cultural, economic as well as physical vulnerability. Additional variations include a calculation of specific damage incurred, which at times falls within the estimation of economic vulnerability, including potential structural loss. The consideration and eventual use of the above equation requires an understanding of its factors. The attempt to explain the complex concept of risk within this thesis provides a division of 1) the calculable or more physical elements of risk, and 2) that which is not immediately quantifiable and requires a more socio-political approach. Both of which are stressed as equally important within an understanding of applying and understanding the broader concept of risk.

Hazard

The typically physical factor in the standard risk equation, hazard, can be considered in both natural and manmade terms and encompasses events such as flooding, landslides, earthquakes, and chemical spills, among many others. Taking the definition provided by the UNISDR within the Hyogo Framework for Action, hazard is taken to mean a “potentially damaging physical event, phenomenon or human activity that may cause the loss of life or injury, property damage, social and economic disruption or environmental degradation” and includes both immediate and latent conditions (UNISDR 2005, p 1). The processes engaged and culminating into a hazard can be natural through geological, hydro-meteorological (as in the case of the CHANGES project), and biological, and can also be of human origin including processes such as environmental degradation as well as technological hazards (UNISDR 2005, p 1). Other definitions within the literature, such as that provided by the Australian/New Zealand Risk Management Standard referred to within the IRGC White Paper on Risk Governance, reiterate the potential of a given event to cause harm or loss as a common characteristic of a hazard (IRGC 2006). Another common characteristic is that a hazard cannot be prevented in absolute terms, but that efforts

can be made to reduce its impact. This can be addressed in recognizing that hazards have, according to Fleischhauer (2006), a “spatial relevance” where recognizing the need for permitting space for a given hazard within; for example, land use planning is of particular importance (Schmidt-Thomé and Greiving 2008). Recognizing the spatial relevancy also acknowledges the spatial variation of a hazards’ respective impacts and that this variation makes aggregation of hazards a difficult task (Schmidt-Thomé and Greiving 2008). The variability within this commonly physical factor of the risk equation is complemented by that of the other primary factor, vulnerability.

Vulnerability

Though many definitions of vulnerability exist, physical vulnerability can be addressed within the terminology used within the IRGC White Paper on Risk Governance where vulnerability is “the extent to which the target [or society] can experience harm or damage as a result of the exposure (for example: immune system of target population, vulnerable groups, structural deficiencies in buildings, etc.)” (IRGC 2006, p 81). The definition implies there is a physical, and oft more quantifiable, element of vulnerability where damage to structures or loss of life are typical measures. The physical aspects of vulnerability are and have been measured through a myriad of factors, or indicators, in a rich literature pertaining to vulnerability assessment. However, the definition also implies a non-physical element, where societal characteristics (i.e. what makes for a vulnerable group) can determine vulnerability of a given community. It is important to note that what determines vulnerability can be disaster independent (Schmidt-Thomé and Greiving 2008). Dimensions, and otherwise determining factors, of vulnerability have been considered in several frameworks with respect to different schools of vulnerability research such as food security, global environmental change and disaster risk reduction (Birkmann 2006a). It is acknowledged that, across these schools, “nearly everyone views vulnerability as an ‘internal side of risk’” where vulnerability is “an intrinsic characteristic of a system” (Birkmann 2006a, p 10). Though vulnerability is considered intrinsic, this is not to say it is permanent; but that it is a combination of varying degrees of exposure and susceptibility and, according to some frameworks, is reduced through increased resilience (Vinchon et al. 2011). However, it is important to note that this concept of vulnerability, as a factor for the broader concept of risk, is complex and not necessarily calculable.

The aforementioned transition from the traditional concept of risk includes the more social components of vulnerability which explain, according to Steinfuehrer et al. (2011), “. . . why certain groups of people may be more exposed, more sensitive, and/or have less capacity to adapt to and cope with the impacts of natural disasters than other groups” (Steinfuehrer et al. 2011, p 8). This emphasis placed on social phenomenon is typical of what Cardona et al. (2003) state as more oft considered by scientists in psychological, social and histori-

cal fields and what tends to take what is termed as a “constructivist” approach (Cardona et al. 2003).⁹ They further argue that both the social phenomenon and the alternative, the “realist” approach, often used by those within engineering and geosciences fields, must be used in tandem. As such, in understanding the physical factors of risk one must also understand the more social and political factors prior to taking action on adaptation and management strategies (Steinfuehrer et al. 2011).

This section leaves off from the former by describing the risk governance framework where the previously described concepts are combined under the context and ultimate goal of disaster risk reduction. The origins of this concept according to van Asselt and Renn (2011) occurred within the “TRUSTNET-concerted action on risk governance”, a three year program funded by the European Commission through the EU Sixth Framework Programme call for research concerning “risk governance and ethics” (van Asselt and Renn 2011). Additional projects supporting the Sixth Framework’s call include MIDIR, RISKGOV, Marie Curie Initial Training Network Mountain Risks, GoverNat, and SAFE FOODS. The concepts derived within the TRUSTNET program asserted that risk governance takes a normative approach where risk affected parties are included in decision-making processes particularly within the Mutual Trust Paradigm (TRUSTNET 1999). In the beginning stages of its conception and development, risk governance was interpreted loosely until advances made by the International Risk Governance Council in which aspects such as “the inclusion of the societal context and a new categorization of risk-related knowledge” were introduced (Renn 2009, p 7). The IRGC further defines risk governance as “the totality of actors, rules, conventions, processes, and mechanisms concerned with how relevant risk information is collected, analysed, and communicated, and how regulatory decisions are taken” (IRGC 2006, p 22). It is from the framework, including definitions, proposed by this organization that the risk governance framework within this research is initially based.¹⁰

3.4.3 The risk governance framework

The framework used for understanding risk governance in this research stems from the risk governance framework provided by the International Risk Governance Council (see Figure 3.4).

In consideration of the present critiques of this framework (Renn and Walker 2008), the research proposed hopes to expand and improve the above structure. This framework

⁹ This is stated in contrast to the “realist approach” taken more often by scientists within engineering, geology, epidemiology and economics which tends to use an assessment of risk based on quantifiable hypotheses (Cardona et al. 2003)

¹⁰ “Initially” is emphasized to highlight that the present research does not rely solely on this framework but hopes to expand on this framework through the inductive part of the research process.

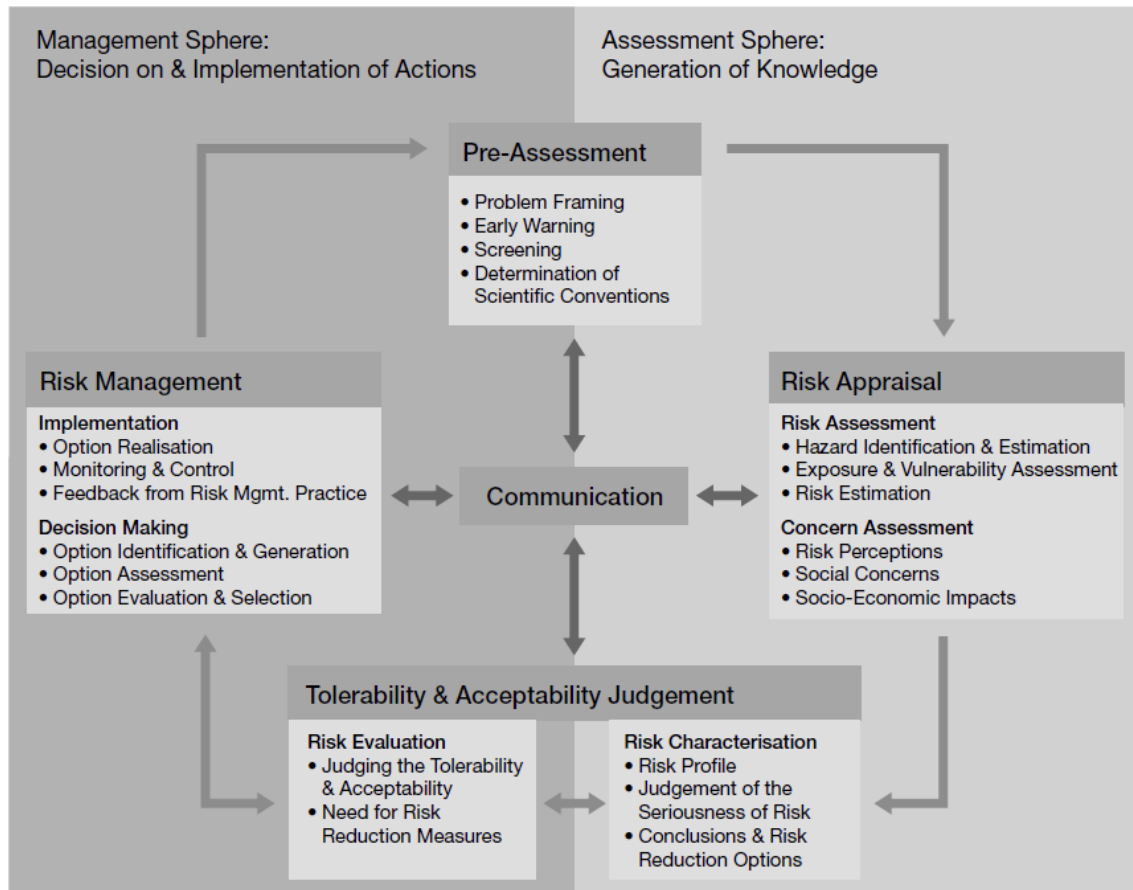


Figure 3.4: IRGC Risk Governance Framework. The figure is from p.13 of the White Paper on Risk Governance and demonstrates the management and assessment sphere, with communication as a central node (IRGC 2006, p 13).

is chosen as a basis for a number of reasons pertaining to its applicability for the present research topic. First, the framework as described by the IRGC White Paper on Risk Governance incorporates both the “largely technological or scientific factors . . . [as well as] values, concerns, [and] perceptions of risk” (Renn and Walker 2008, p 333). Another rationale is the intended target audience of the framework. This tends to be mostly based within the public and civil spheres and is thus similar to the audience focus of the present research. It should be noted, however, that there is a potential mismatch with the absence of addressing multiple scale representation and multi-hazard events. This is of importance for the risks considered within the CHANGES project and serves as potential points of how the present research can expand on the above framework (part of the inductive, or theory generating and contributing, process). For brevity, this chapter only goes into brief detail of the IRGC framework within the discussion presented in the following sections.

Risk governance is a multi-actor process involving multiple levels of administrative structures within a given society and includes “legislators, judges, industry groups, environmen-

talists, [and] citizen's groups" (Stern and Fineberg 1996, p 2). Thus, the inclusion of the societal context is directly applicable to the present research's use of the IRGC framework in that it accounts for all actors that work within and influence the administrative structures of the risk governance process (i.e. roughly divided into the elements of risk assessment, risk management, and overall risk communication). Actors working within the assessment of risk must operate in the increasingly uncertain environments society must cope with. Consequentially, actors in risk assessment must consider the other actors within society and the need to build trust between these actors and the decisions made based on the impact of risk assessment on risk management practices (De Marchi and Ravetz 1999). Importance within the literature is therefore stressed both on the use of democratic institutions to provide participation and on understanding of the relationships among those who participate in the decision-making process (Steinfuehrer et al. 2011). In understanding these relationships, one can establish the roles played by different actors within both the vertical and horizontal dimensions and their overall influence on policy development and implementation (Assmuth et al. 2010).

Risk assessment

The process of risk assessment often occurs for single hazards but has long been stressed as necessitating a multi-hazard approach to research on hazard assessment (White and Haas 1975). With respect to assessing hazard, this part of the process typically includes understanding the potential intensity, localization of the phenomena, and the probability and frequency of its occurrence. The hazard component is merely one part of risk assessment, which focuses not only on understanding the potentially harmful phenomena, but the identification and characteristics of exposed elements, which deals more with the vulnerability side of the risk equation (Lacasse 2013). The vulnerability component deals with the exposed elements including those that are physical, but also social, economic, environmental, and those related to perception, which can be seen as in the "concern assessment" part of "risk appraisal" in the IRGC risk governance framework (IRGC 2006). The process, furthermore, encompasses assessments for "the evaluation of the effectiveness of prevailing and alternative coping capacities in respect to likely risk scenarios" (UNISDR 2009, p 26). Risk assessment should also be seen as an ongoing process of knowledge generation and building understanding for informed decision-making (Greiving et al. 2006; Lacasse 2013; IRGC 2006).

Risk management

Like risk assessment, risk management is a continuous process of identification, analysis, and the development and implementation of strategies for reducing disaster risks (Nirumpama 2013). The understanding of this process within the thesis is that risk management encompasses the entire disaster risk management cycle, including the pre-

emergency phase which includes prevention and preparedness, and the emergency phase (response) and post-emergency (recovery) (Greiving et al. 2006). The IPCC frames risk management further as “[a]n iterative process involving monitoring, research, evaluation, learning, and innovation [that] can reduce disaster risk in the context of climate extremes (robust evidence, high agreement).” (IPCC 2012c, p 3). Effective implementation of risk management efforts can provide for what are called “low regrets” measures that complement and address a range of future scenarios. These include, for example: early warning systems, sustainable land use planning and management as well as ecosystem management in addition to improved education and awareness, adherence to building codes (and their development) and improvements in water resource management (e.g. particularly drainage) (Intergovernmental Panel on Climate Change 2012c). Management practices that work towards these types of measures and encourage a portfolio of different kinds of actions increase capacity and enhance flexibility of risk management strategies.

With respect to the difference between risk assessment and risk management, the IRGC risk governance framework sets them as two different spheres, albeit with various inter-linkages. It is important to note that there is some debate whether risk assessment should be viewed as a separate process from risk management (Assmuth et al. 2010). The stance of this thesis is that the two are not completely separate entities, but inform and influence one another, with risk management acting as more of the umbrella term. This understanding is based on the review of terminology and definitions from a range of sources and the recurrence of properties of the assessment process presented within descriptions for risk management (and also the specific term of “disaster risk management”) (see UNISDR 2009; IPCC 2012b; Lacasse 2013; Nirumpama 2013; Assmuth et al. 2010).

Risk communication

In understanding risk communication (a central tenant in the risk governance framework), the research borrows from Lindell (2013) and the IRGC White Paper, and defines this as: the provision or exchange of information regarding risks and hazards to a given individual, public, organization, or society via unilateral (one-way) or bilateral (two-way) means of communication. One of the important characteristics influencing especially response to natural hazards are the methods of communication of risks employed both before and after a hazardous event. This topic of communication, and how well methods for this are used, is well connected to the afore-mentioned shift in governance where one can see substantial movement toward inclusive and more participatory governance within democratic societies. It is stated that this is encompassed within a shift to what is called the Mutual Trust Paradigm as opposed to the previous Top-Down Paradigm which serves as the classical approach where the decision-making process is dominated by public authorities (Heriard-Dubreuil 2001; Assmuth et al. 2010). Evidence of the paradigm shift is noted

by Heriard-Dubreuil (2001) through “the appearance of new patterns of decisions where the categories of actors involved (public authorities, experts, stakeholders) play a different role.” (Heriard-Dubreuil 2001, p 247). Stakeholder accountability and responsibility is crucially valued within the Mutual Trust paradigm and is deemed more beneficial when making decisions amidst high uncertainty and complexity by offering a means of legitimacy and support for the decision-making process (Heriard-Dubreuil 2001). In changing from the more traditional model, one can also see more balancing of powers between the state and society (Assmuth et al. 2010). This has been obvious particularly in water governance within the growth of public private partnerships in the water sector and the development of Integrated Water Resource Management (IWRM) strategies (Rouse 2013). It is further reflected within the European sphere as part of what should be included within “good” governance practices (more on this in the chapter section 3.5).

The understanding of roles for those communicating risk information is also considered within the risk governance framework provided by the IRGC through the concept of the “actor network”. The actor network, within the understanding of the IRGC framework, is unique to the societal context in question and encompasses “those involved in dealing with the risk (the organisational capacity) and those who have a potential stake in their management or outcomes” (Renn and Walker 2008, p 359). These stakes are a key component in context specificity, and in understanding the consequential development and implementation of policy strategies which are highly dependent on the socio-political context and the perceptions held within that context (Assmuth et al. 2010).

3.4.4 Perceiving risk

It is widely acknowledged within the literature that, though there are physical elements of risks, risks are ultimately socially constructed and that significant power lies in the individual or entity which defines risk (Slovic 1999; Beck 2006; Schmidt-Thomé and Greiving 2008; Firus et al. 2011). This follows closely to what Slovic and others have termed the psychometric paradigm, which can be described in understanding risk as subjective and dependent on cultures and the mindset of a particular entity (Kappe et al. 2006). Within this paradigm, there are two particularly important determinants of risk perception: 1) the “dread factor” or “amount of dread (fear, emotional unrest) that is evoked by a risk”, and 2) the unknown or “. . . the degree to which a risk is known” (Kappe et al. 2006, p 26).¹¹ These factors are also influenced by a third important factor, personal experience, where especially awareness of a given risk is often generated through direct experience with a disaster (or fruition of a risk) and is heightened depending on how recent this experience is

¹¹ These two factors are listed by the FLOWS WP2A-5 Report, Interactive Learning Groups, as part of a total of seven factors which includes the extent of: increasing risk, dread, known to exposed, support, trust, known to science, and control (Kappe et al. 2006, p 26).

(Steinfuehrer et al. 2011). These factors influence changes in risks and are perceived and can occur mainly for the first two factors, regardless of the existence of a “real risk”.

“Objective” versus “Subjective” risk

Slovic (1999) argues that there is no real or objective risk and that subjectivity also exists within quantitatively based theories. However, it is also argued that there is a difference between what is considered “real” versus “perceived” risk, that the interpretation of this is based “according to individual and social contexts”, and that there is a distinction that can be made “between the factual and the ‘socio-cultural’ dimension of risk” (Firus et al. 2011, p 11). According to Bradbury (1989), there are two identifiable groups of studies within this topic, where one is the traditional technical approach and the other is the psychometric and social science approach. The technical approach is concerned most with probabilistic risk assessment while the psychometric approach is more concerned with the beliefs and values that influence risk assessment. Critiques from the latter, the psychometric approach, state that the use of “perceived risk” within this approach is misleading and that the use of this term tends to “connot[e] that natural sciences study reality, while the factors discovered by the social sciences represent ‘mere perceptions’” (Bradbury 1989, p 384). Both the public and experts make judgments which are subject to bias (Slovic 1999). The common model, where the expert provides the real or “objective” risk and the public is considered as relying on perceptions based on irrational emotions, can discourage cooperation especially in sharing local, public knowledge (Fischhoff 1979; Fischhoff et al. 1983). There is a need to avoid this dichotomy and to involve citizens and encourage participation and effective communication to further encourage mutual learning instead of trying to educate the public through one-way communication pathways (Bradbury 1989). Understanding risk perception and knowledge gained from mutual learning is essential for the acceptability and consequential development and implementation of risk reduction strategies.

To work toward risk reduction strategy implementation, consideration must be taken of the perceptions and need for interaction of those who are affected by these risks. This is of crucial importance with respect to defining what level of risk is acceptable in a given community, and especially as what is deemed “acceptable” in one region is not necessarily the same in others, even if the risk is considered similar or the same (Schmidt-Thomé and Greiving 2008). The need for acceptability by those affected implies and has been stated in the literature to mean that objectivity is not “all that is needed for decision making on risk issues” (De Marchi and Ravetz 1999, p 744) and further that “decisions based on statistical probabilities are too narrow to be used as the basis for social acceptability” (Bradbury 1989, p 390). It is argued that taking a cultural approach to consideration of risks is a beneficial way to meet these needs. The cultural approach, according to Bradbury (1989), considers

policy development by first starting with risk perception and stressing the importance of risk communication in order to understand cultural perspectives. Two-way communication is emphasized and is considered as a tool, not an end goal, for improved cooperation and participant relationships which impact decision-making processes and policy framing.

Risk framing

Topics framed and addressed within risk-related policy development are influenced by expert opinion, public values, and societal concerns. Framing of risk occurs based on the many frames of references amongst the various actors in a given society at risk. These frames are culturally related and encompass “assumptions, expectations, and decision rules or criteria for assessing knowledge claims, structuring inquiry, and constructing meanings” (Bradbury 1989, p 388). The process of risk framing has important implications for decision-making because, as stated by Heriard-Dubreuil (2001), it is strongly influenced by societal values as well as science. This is expressly important when considering that the public typically sets agendas, and why therefore public perception is important for establishing legislative priorities (Slovic 1999). This assists tremendously in proper problem identification, and overall policy development; because if identification is poor, then time, money and energy will be spent trying to “solve the wrong problem” (Bradbury 1989, p 380). Evaluation of a risk problem involves a complexity of actors as well as institutions and political cultures that influence the framing, use of scientific evidence and ultimately decisions made and strategies implemented toward risk reduction. Making risk-related decisions requires value judgments and must consider all involved actors and the sub-politics occurring within actor interaction (Slovic 1999; Bulkeley 2001).¹² Changing risks challenge the status quo of current institutions, organizations and regulations, and generate a disaster reactive response by driving change in the current political system and the actions of the actors thereof (Gandy 1997). Understanding the governance of risks is therefore a critical part of addressing the challenges posed by these changes and the socio-cultural contexts in which they occur.

Risk culture

The importance of the cultural context of risk governance is particularly relevant, given the diversity of the European contexts and different countries' risk governance strategies (TRUSTNET 1999, ii). The connection between risk culture and the broader risk governance concept (and above framework) can be described through the following quote from Rao (2006):

¹² Sub-politics here refer to policy networks comprised of organisations, institutions and individuals (Bulkeley 2001).

Risk assessment methodologies are incomplete if they do not incorporate the risk cultural dispositions of the target population. A deeper understanding of risk culture will help make risk assessments more effective and risk management regulation/policy making more focused. This necessitates development of a ‘soft’ approach to risk assessment (Rao 2006, p 209).

The above quote emphasizes the importance of incorporating consideration of the risk culture context within both assessment and management. This is also found within the IRGC framework through the “concern assessment” which is taken from fields of social science and provides information on risk perception, concerns, and expectations held by different cultures or members thereof (Renn and Walker 2008, p 351). The concept of culture is also found through consideration of the political and regulatory culture (Renn and Walker 2008, p 352). This is considered a broader level than the actor network and encompasses the social climate (i.e. trust, civil society involvement), actor networks, organizational capacity, and finally core risk governance process. This broad category is meant to consider the different regulatory styles in which countries (or sub-national entities) handle risks. The concept of risk culture within this research works similarly to the framework provided by IRGC and follows the statement by Assmuth et al. (2010) that “risks have social and psychological dimensions, and are shaped by values, beliefs, political systems and cultural factors” (Assmuth et al. 2010, p 3843). The cultural differences stated here are also influenced within the European context by the legal and administrative framework (or family) belonging to each case study area, which is based on the history of legal development in a given study site, and which greatly influences strategy implementation in, for example, spatial planning practices (Firus et al. 2011; Newman and Thornley 1996). The research proposed considers in part actor networks, social climate, and political and regulatory styles as factors toward identifying the risk culture amongst the different case study sites. Consideration of these factors with respect to the risk governance framework requires reflection of the risk culture setting and how it contributes to risk policy implications and overall strategies for disaster risk reduction. The research initially makes use of the “cultural setting” framework proposed by the GACGC (2000). The figure visualizing this framework has been modified from its original content and is presented in Figure 3.5.

The figure identifies that the cultural setting is composed of all the actors (individuals) and entities that make up the social community, including what factors (the media) which act as arguably external influences in combination with the actors and entities to produce perceived risk properties. The figure further visualizes the connection to these components and their product to implications for risk policy including agenda setting, priority assignment, policy development and strategy implementation. It is important to reiterate the context specificity of what is presented in this figure and that this is vital within a

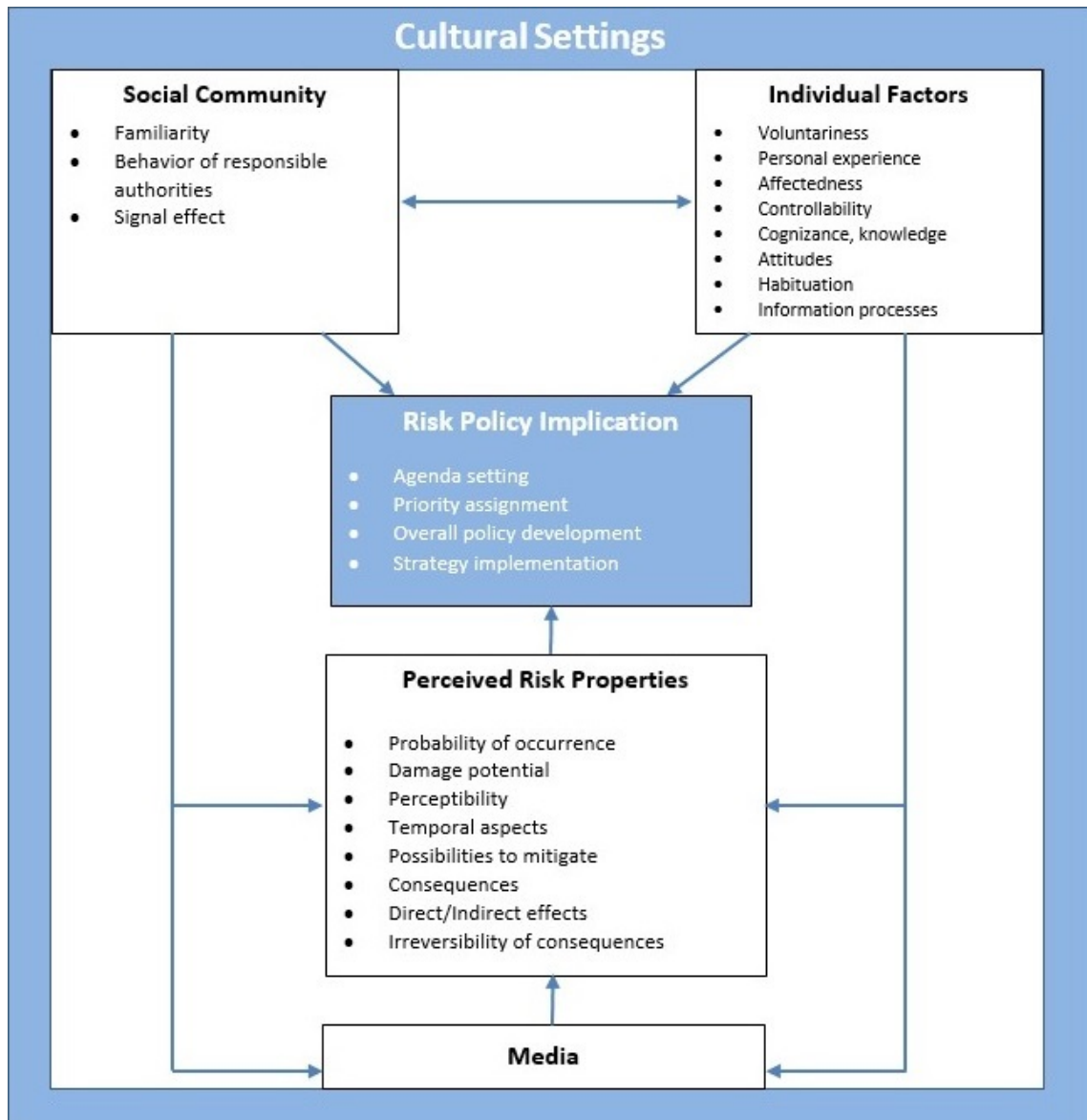


Figure 3.5: Culture settings: overview of sociocultural, social, and individual risk. This figure has been modified from its original version provided by the GACGC (2000, p 158) in order to reflect the connection to risk policy implications.

comparative analysis in a European context, as pursued in this thesis. Particularly with respect to recent EU legislation, there is currently a push toward “the creation of a culture of disaster resilience” which has been identified as “a crucial challenge for current European societies” particularly amidst increasing uncertainty (Steinfuehrer et al. 2011, p 3). However, it is stated and taken as an assumption in this research that, during a time of increased uncertainty, establishing an understanding of the risk culture in a given case study is essential for efforts to enhance current governance strategies and reduce the impact of disasters (Rao 2006). It is in using this understanding, and especially the perception of

those who are effected by and manage risks, that the research attempts to identify patterns of “good” risk governance strategies (or issues thereof) across cases.

3.5 Defining “good” risk governance in managing extremes

As one of the central tenants of the research at hand, the inclusion of “good” governance (and principles thereof) within risk governance processes is considered essential to successful efforts in disaster risk reduction (Galperin and Wilkinson 2015). Leading off from this premise, the main message of this section is to communicate, in brief, basic background information with respect to the “good” governance perspective employed in the research approach. This section gives examples into some of the present understandings of good governance and good governance principles, and especially as it relates to the European context. Information is then also given with how this pertains to risk governance and some examples of previous research that attempts to measure and assess these topics. The section then concludes with a brief list of take-home points from the literature as a transition to the conceptual framework provided in the next chapter.

3.5.1 Examples of “good” governance

With respect to “good” governance, the thesis bases its understanding of the term from the work provided by Weiss (2000), and defines this as: the performance of processes of governance that encompasses the rule of law and respect for human rights, ensures administrative transparency and capacity, efficiency and decentralization of resources, as well as citizen participation and non-discrimination (among other commonly noted and key principles). The definition is primarily based on the many works reviewed and presented by Weiss (2000) on the concepts of both “good” governance, and governance itself. Although this source provides a number of key examples of these concepts from the World Bank, United Nations Development Programme (UNDP), the Organization for Economic Cooperation and Development (OECD), the Institute of Governance, and the Commission on Global Governance, the research must also consider principles of “good” governance within the European context. These principles of “good” governance can most readily be found within the White Paper on European Governance which lists the following principles: openness, participation, accountability, effectiveness, and coherence (see Table 3.2).

The principles described exemplify that which is emphasized within Hériard Dubreuil’s Mutual Trust Paradigm and are closely related to examples from the OECD which include the following: “openness, transparency, and accountability, fairness and equity in dealing with citizens, and efficient and effective services, clear and transparent laws and regulations, consistency and coherence in policy formation, respect for the rule of law and high standards of ethical behaviour” (Bosselmann et al. 2008, p 5). These are similarly found

Principle	Principle Description
Openness	Active communication in understandable language (importance for legitimacy in the public eye), communication is made in an “open manner”
Participation	“The quality, relevance and effectiveness of EU policies depend on ensuring wide participation throughout the policy chain – from conception to Implementation“ (White Paper on European Governance, 2001, 10), stresses also that this is needed to build confidence
Accountability	Need for clear roles and responsibilities (again at all levels)
Effectiveness	Decisions taken at “most appropriate level”, policy must have clear objectives and provide evaluation for future implementation
Coherence	Need for policies to be easily understood

Table 3.2: White Paper on European Governance principles of “good” governance. The table identifies and describes the five principles as considered in key EU policy (CEC 2001).

within the United Nations Development Programme’s policy document on “Governance for sustainable human development”, which also features accountability, participation, and rule of law seen in the OECD and in (at least for accountability and participation) the EU White Paper, but lists additional principles (UNDP 1997). These include transparency (touched upon by OECD), responsiveness, consensus orientation, equity, and strategic vision. These documents, among others, were considered and are elaborated in later chapters of this thesis in consideration for analyzing and integrating concepts of “good” governance into a “good” risk governance analysis tool and are, therefore, not further elaborated within this chapter.

A fair majority of the variety of “good” governance characteristics provided in the literature arguably rests on communication. This can be understood especially with respect to risk communication as the degree of public involvement. Though a rich amount of literature exists with respect to communication methods, a brief introduction is provided from a commonly sourced example, Arnstein’s Ladder (Arnstein 1969). This particularly deals with public participation and is presented in Table 3.3, highlighting a series of “rungs” in which levels of participation increase starting with nonparticipation (represented by manipulation and therapy forms of participation), and working toward information provision and exchange (although still in the form of tokenism), to participation forms in which shared decision making power is evident (including partnerships, power delegations, and citizen control).¹³ It is argued that improved communication equates to a willingness to communicate with the public and that this is enhanced through public participation in decision-making processes, which suggests two-way rather than one-way communication is

¹³ For more on this topic and in relation to resilience and risk management in practice, readers are encouraged to consult Mägdefrau and Sprague (2016).

optimal (Rouse, 2007). In this way, decision-making retains a degree of transparency and legitimacy through, for example, implementing policy which moves toward the higher rungs of the ladder. Two-way communication can be considered as crucial in seeking resolution when facing high uncertainty environments.

Category	Level	Form of Participation	Description of Participation
Citizen Power	8	Citizen Control	Examples: funding of communities to run their own co-operatives and developing projects
	7	Delegated Power	Citizens have dominant decision-making authority on a specific item or plan (through majority of seats)
	6	Partnership	Power is redistributed through negotiation between citizens and power holders
Tokenism	5	Placation	A token degree of influence by having hand-picked individuals on Public Bodies
	4	Consultation	Further step (Public Meetings) but offers no assurance that concerns or ideas will be taken into account
	3	Informing	An important step but tends to be one-way with no channel for feedback
Nonparticipation	2	Therapy	Citizens who may complain are given something (therapy) to divert their attention – (not relevant to water but healthcare) – gets them to not focus on the issue
	1	Manipulation	Citizens put on advisory committees for the express purpose of educating them or engineering their support

Table 3.3: Arnstein’s Ladder of Participation. The table provides the description and category for each rung (level) of the ladder of participation according to Sherry Arnstein (Arnstein 1969, p 217). The level of participation increases as one moves up the ladder (Rouse 2013).

Good communication practices, as part of a wider concept of “good” governance, are especially vital with respect to a risk communication context. It is argued that such practices can foster trust, increase awareness to physical risk, promote mutual learning and exchange of local knowledge and will ultimately assist in governance focused efforts toward disaster risk reduction (Assmuth et al. 2010; Höppner et al. 2010). Communication is also seen as a cornerstone towards establishing equity and legitimacy, considered to be important measures of successful adaptation (Adger et al. 2005).

3.5.2 “Good” risk governance and past assessment literature

A number of examples can be found in past research related to the assessment of risk governance, or aspects of risk governance, as well as to consideration of “good” governance

principles. Many of these examples include systems indicators and assessment tools to apply in different contexts. A wide variety of assessment systems exist for vulnerability. A detailed overview of a wide range of these systems is provided in Birkmann (2006b) with the chapter titled: *Indicators and criteria for measuring vulnerability: Theoretical bases and requirements*.¹⁴ Examples provided include the Social Vulnerability Index by Cutter et al. (2003) developed for the United States, as well as the “*Indicators of Sustainable Development: Framework and Methodologies*” from the United Nations Commission on Sustainable Development and Division for Sustainable Development (UNCSD DSD 1996) and the UNU-EHS Working Paper presenting the results of the “Measuring Vulnerability – Expert Workshop in Kobe, Japan”, among many others (Birkmann 2006a). Though these examples primarily focus on vulnerability, they provide important insight into what should be considered as key criteria for understanding analysis of risk governance.

Other examples with respect to assessing and analyzing aspects of risk governance are found in previous research projects funded by the European Community including RISKGOV (Comparative Analysis of Risk Governance for Radiological and Chemical Discharges of Industrial Installations) (Schneider et al. 2004), and MIDIR (Multidimensional Integrated Risk Governance) (Greiving et al. 2007). The RISKGOV project, although formally engaged with radiological and chemical hazards, provides a structure of approach similar to how the present thesis considers “good” governance principles within the governance of risks. The project includes aspects of acceptability, accountability, sustainable development, and social trust and confidence which can be seen to reflect consideration for the categories of the “good” risk governance analysis tool presented in this thesis. This is very much similar to the listing of accountability, transparency, and participation. Although participation is not stated directly in the RISKGOV listing this appears to be a highly important principle when reviewing the project’s report content. With respect to the MIDIR project, the thesis drew directly from the work of MIDIR in the formulation of the “good” risk governance categories, especially in the consideration of “resources” as an individual category. The scorecard developed and employed within this project also helped inspire the use and interpretation of the similar use of the traffic light system found within this thesis.

Another key example, and one from which the research at hand directly borrows, is the risk governance deficits framework provided by the IRGC. Risk governance deficits are defined as:

¹⁴ This volume has been updated as of 2014; however, the 2006 version has been used in supporting the research presented in this thesis.

deficiencies (where elements are lacking) or failures (where actions are not taken or prove unsuccessful) in risk governance structures and processes. Deficits hinder fair and efficient risk governance and increase the severity and cost of a risk event (IRGC 2010, p 5)

These deficits are explained as producing potential adverse consequences that affect human life and health, as well as the economy, the environment, “and social and political institutions” (IRGC 2010, p 5). Consequences are elaborated to also include potential failures in taking necessary action and resulting loss of lives and property, but also potentially adverse consequences in overreaction leading to inefficiency and poorly used resources. The present thesis draws from this understanding of “deficits” and their consequences, and also from the two “clusters” identified by the IRGC: Cluster A which relates to risk assessment and understanding (echoing the assessment “sphere” presented in the IRGC risk governance framework); and Cluster B which is connected to the management of risks and addresses issues of responsibility and actions for mitigation and risk avoidance (the management “sphere”). The thesis considered the elaboration of these different clusters and the many examples given for their specific deficits in the formulation of the category and indicator analysis tool along with the inputs of the MIDIR project, as well as several of the aforementioned resources in this section. This process will be explained in the fieldwork and policy analysis process described in Chapters 5 through 7.

3.5.3 Basic take-home points from literature and conceptual departures

This last section provides the reader with basic “take-home” points that serve as a conclusion and short summary of some of the issues that are taken from the literature and addressed in the conceptual framework provided in the next chapter.

Risk complexity is a result of changing environmental and social-ecological systems, and especially faces extreme spatial variation particularly in “the extreme spatial temporal variability and scale of influence characteristic of mountain geo-ecological systems, plus the varied and rapidly changing social-ecological systems in and interconnected with mountain regions [that] pose significant challenges to governing and managing risk” (Gardner 2015, p 351).

Risks, and how they are defined, **strongly depend upon socio and cultural values and the local political system** (Slovic 1999; Kasperson et al. 1988; Felt et al. 2007).

There is a notable **shift** within risk assessment, management and risk governance in general: see previous determination to exclude **social-political factors** within assessment

stage, now shift to include this. (Heriard-Dubreuil 2001).

There is also an **increasing importance** placed on **stakeholder involvement and communication**. (IRGC 2006) (Reiterated within EU policy documents and as well as literature).

Attention within risk governance analysis must be paid to both **vertical** (or hierarchical) and **horizontal** (cross-sectoral) dimensions (Young 2002).

“Good” governance principles have been reiterated to include the following: accountability, transparency, participation, coherence, effectiveness, sustainability, equity, acceptability (see White Paper on European Governance, International Strategy for Disaster Reduction) and are seen as essential to the function and success of risk governance strategies (Schneider et al. 2004; Galperin and Wilkinson 2015; IRGC 2006).

Risk governance is region specific and varies depending on factors such as “socio-political contexts, value choices and decision structures in each case” (Assmuth et al. 2010, p 3943).

Within the EU context, **Member State are at different starting points** (ESPO Climate 2011), and particularly so in their process toward good risk governance practices with varying institutional barriers.

There is **need for flexibility**, update, and revision of risk assessment and management strategies (explicitly stated within EU Floods Directive, (Official Journal of the European Communities 2007)).

Chapter 4

Conceptual understanding

4.1 Conceptual framework: presentation of the risk governance system

The framework diagram (Figure 4.1) is a visual representation of the topic at hand. It provides a clear understanding of the system in which risk governance takes place. The system is comprised of the inputs into risk governance and the output of risk governance processes. The output highlights the overall goal, reducing disaster risk. This section explains in detail the necessity of the system representation, the relationships between the elements of this system and explains how the overall framework supports the research focus.

The framework provides a visual representation of the complex system in which risk governance operates. It is of vital importance to demonstrate an understanding of this system prior to operationalizing a method with which to evaluate and compare risk governance strategies. The framework attempts to highlight how each part of the system interacts with the other parts. The interactions, or relationships, are demonstrated through the use of explanatory arrows between the major parts (inputs, process, and output) and through the use of simple equations for the relationships among the components of these major parts. The equations here are used strictly for explanatory purposes and will not be used for direct calculation. Each major part borrows from a previous framework and body of literature and contributes to the overall research goals.

4.2 Changing risk system inputs

The first part describes the inputs of the system. The “changing risk inputs” part follows according to previous research which highlights the commonly given parts of the risk equation (Birkmann 2013). Though inputs to this equation in the literature are many, the framework here attempts to simplify by distinguishing between social and physical inputs

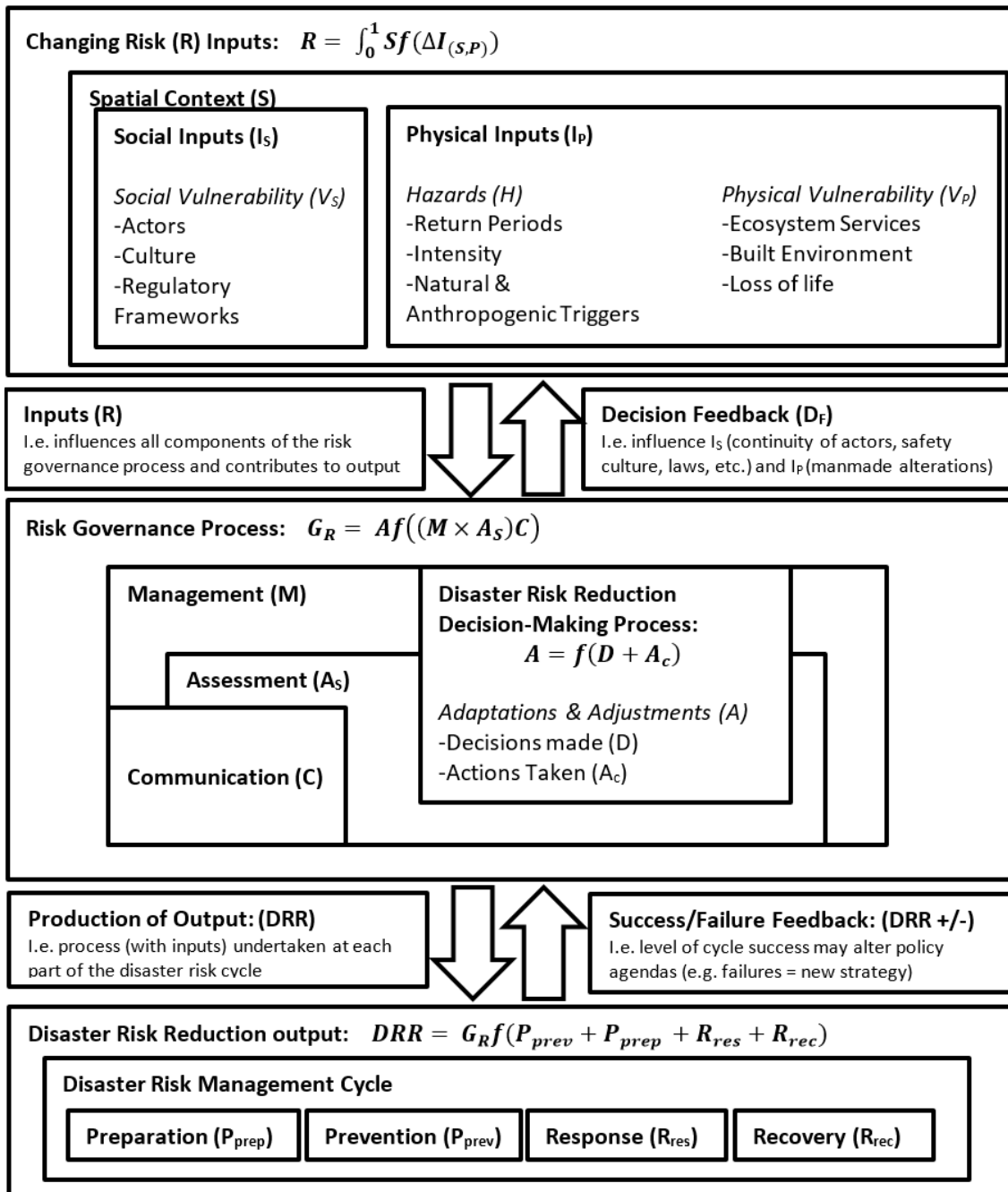


Figure 4.1: Risk Governance as a system. The diagram provides an understanding of the system in which risk governance takes place. The system is comprised of the inputs (changing risk within a spatial context) which feed into the risk governance processes that work toward the output of reducing disaster risk at all stages of the disaster risk management cycle.

and by adding an explicit spatial context twist. This is seen as crucial especially in relation to river basin management in that "without considering the specificities of place, including different hydrologies, climates, population structures, histories, cultures, socio-economic situations and population capacities, [this] may lead to inappropriate or unimplementable water management actions at the local scale" (Daniell et al. 2014, p 472).

The statement from Daniell et al. 2014 draws attention to both physical and social parameters of place that should be considered. The social inputs within the presented framework are comprised of that which encompasses social vulnerability (V_S); namely, actors, culture, and regulatory frameworks. The items listed under this category are selected for a specific purpose. The combination of the three represents the different elements of society. The actors are the individuals or group entities who operate within the system and can contribute to risk through their actions (or lack of actions). Culture is listed as it encompasses the cultural contexts which influence and contribute to a predisposition but also general tendencies and characteristics of a society, making it more or less vulnerable than other societies. Culture is listed especially in relation to the connections made to risk policy decision-making as highlighted in the framework provided by the German Advisory Council on Global Change (2000) where risk perception, characteristics of both society and the individual, and the media all act as inputs into risk policy development as well as effect overall risk (see also connection to policy development, culture, and risk in Rao (2006)). The combination of these items, to an extent, also encompasses that which serves as the common building blocks of institutions and can therefore attempt to address institutional vulnerability. It is for this reason that institutional vulnerability is not directly stated within the framework. Though the social inputs are the main foci of the research, they are presented in a manner within the framework which places them in equal standing with physical inputs.

The physical inputs (I_P) contain both hazards (H) as well as physical vulnerability (V_P). The term 'hazards' is here given with items listed to represent the common characteristics, intensity and frequency. The latter represented by return periods. Attention is also given to provide for the fact that there are both natural and anthropogenically occurring factors which lead to the triggering of these events (Michoud et al. 2012). One prime example of this, particularly in mountain environments, is construction including the construction of roads, settlements, and general infrastructure that impact the stability of slopes and general natural flow of the hydrological system (Gardner 2015). It is also important to note that the plural "hazards" is used in lieu of the singular form as current research has demonstrated that an event is comprised more often than not of multiple hazards. Thus, risk-related research does well to consider a multi-hazard approach. Physical inputs also include that which falls under physical vulnerability. This remains separate from the hazards

within the framework though it is acknowledged here that there is some overlap with the natural and anthropogenic triggers listed under the hazards input. Physical vulnerability is here made up of the natural environment as well as the manmade (built) environment and people. The term “loss of life” is here used to represent this people component and the potential for loss of human life. It is therefore separate from the use of the term “actors” within the social vulnerability input.

These elements encompassing the different inputs into the overall compilation of changing risks occur within and characterize a given spatial context. This stresses the importance of the “place” in which these inputs occur and follows similarly to Susan Cutter’s Hazards of Place Model which incorporates both physical and social vulnerabilities that make up a total “place” vulnerability and enables a multi-hazard approach (Cutter 1996, 2013; Cutter and Finch 2008). The variation of the combination of these inputs making up the spatial context of the system also reflects the “Spatial Mosaic” concept described by Holling which states that “the natural world is not very homogenous over space... but consists of a mosaic of spatial elements” (Holling 1973, p 16). This “Spatial Mosaic” is also encompassed to a certain extent with respect to river basin management and flooding in Squires (2014), in that “[t]he landscape that we have inherited is a complex mosaic of geological activity, weather and weathering, and human innovation” (Squires 2014, p 383). The spatial context as a function of the mosaic of inputs, both physical and social, provides the basis for the changing risk inputs equation.

The equation given for this part of the system demonstrates how risk is based on both social and physical inputs. These inputs are not static, but rather are constantly changing over time, creating more or less risky situations depending on the change. The temporal component of these inputs is demonstrated through the integral 0 to 1, with 1 being the time at which an event occurs (Michoud et al. 2012). This integral is given as risk is taken within this context to be the conditions existing prior to the occurrence of the event, as risk is the probability of damaging consequence but is not the consequence itself. Each of the inputs provided in the risk equation acts as a deterministic input whereby these inputs influence all components of the risk governance process and contribute to the overall output. Further detail regarding these deterministic inputs is explained following the explanation of the risk governance process.

4.3 Risk governance system processes

The different parts of the risk governance process are represented in a series of layers. The first layer represents risk assessment, which tends to occur within the broader context of risk management efforts. Within the literature, there are disagreements between whether

these components of risk governance should be kept separate. The placement of one within the other is here used to highlight the interconnectedness of the two and to stress that a strict separation will not be followed and is not recommended within this research. Communication is located strategically as a corner piece to both risk management and risk assessment, as it is integral to both. The position of communication is based partly on the framework provided by the IRGC (2006), which stresses the central importance of risk communication and its pervasiveness throughout the risk governance framework. What is further represented in this section is the “disaster risk reduction decision-making process”. This is included to emphasize that, as aforementioned, this section is a process toward an ultimate goal. The decision-making process is presented in the framework diagram in a way which demonstrates that it cuts across the sub-layers management and assessment with the connecting component of risk communication. The decision-making process contains the adaptations and adjustments (A) created in result of the decisions made (D) and actions taken (A_C). The D and A_C are separated due to the fact that, in practice, a decision can be made; but it remains to be seen if indeed an action is taken. They may be mutually reinforcing, but one does not necessarily equate to the other. Both however are necessary components of the decision-making process.

The equation given for the risk governance process reflects both the decision-making equation and the other layers. The equation reflects that risk governance equals the resulting decisions made and actions taken as a function of the risk governance components (M and A_S multiplied by the effectiveness of communication) and the spatial context in which these components occur. The risk governance process features a feedback mechanism (D_F) whereby decisions influence both types of risk inputs (I_s and I_p). The framework presented does not visually describe in detail how each of the risk inputs affects each of the elements of the risk governance process due to the need to provide a more simplified representation of the system.

For all inputs, it is important to specifically stress the fact that all inputs are subject to change, as represented in the equation for the “changing risk inputs” part of the system. These changes require a response and adjustment in the currently existing risk governance strategies for which they provide an input. This reiterates the research problem statement, which states that risk governance strategies must adapt to these changes.

As an element of the broader spatial context, the physical inputs feed information into the risk assessment components of the risk governance process. Physical characteristics such as the natural and built environment, as well as the presence of human life, contribute to the assessment of what elements are at risk in a given community. The physical characteristics of the strength of structures serves as one example of how the built environment

contributes to physical vulnerability and the necessary informational input required for effective assessment of risks. The term hazards as a physical input is also a direct informational input to risk assessment. However, it is also directly related to the decision-making process as the occurrence and intensity of a hazard is highly influential with respect to the attention given and the degree of urgency of the situation. Return periods also serve as direct influences into the historical memory of a given society, contributing to its culture of risk (with respect to disaster memory and consequential attention paid to risks) as well as ultimately to the outcome of the decision-making process and what strategies are pursued toward the end goal.

Referring to the social inputs of changing risks, one can consider how actors, culture, and the regulatory frameworks occurring in a given society influence each component of the risk governance process. With respect to actors, the way in which actors operate and the actions they take can either increase or decrease the vulnerability of a given society. Actors facilitate communication and, depending on their actions, can produce effective or ineffective communication. Actors are also generators of knowledge and, when considering local level authorities and the general population, are also generators more specifically of local knowledge. This can also form the basis of information for risk assessment methods especially in areas which have poor scientific data availability. Actors, further, serve as a primary input into the decision-making process in tandem with the cultural biases they carry as individuals and as the groups that make up a given community. They also work in coordination with the regulatory frameworks of which they are obliged to abide by and with which they are able to make decisions and take actions including actions which alter the existing regulatory frameworks. Thus, actors while working in conjunction with the other two social vulnerability factors serve as direct and determining inputs into the decision-making process through the management, assessment and communication of risks within the risk governance process presented.

In regard to culture, this social factor is an influential input toward problem framing within the development of management strategies and decision-making of the risk governance process. It also forms a basis for the concern assessment presented in the IRGC framework which, similarly to the German Advisory Council on Global Change, stresses risk perception and social concerns. Continuing this thought while returning to the definition of risk culture presented in previous chapters, the norms, traditions and beliefs of a particular society (its culture) influences the society's given perception of risks as well as what the society deems to be of highest priority and concern.¹ This is additionally of crucial importance in understanding how and if actions taken and decisions made (part of the DRR

¹ Risk culture is a central tenet within the research analysis and is defined within this research as the combination of the beliefs, norms, traditions, and values that influence and give meaning to the behavior

decision-making process) are tolerated and accepted by society. Culture additionally acts as a direct input into the spatial context as characteristics of society interact with the physical inputs contributing to the overall place vulnerability as described in Cutter and colleagues' Hazards of Place Model (Cutter 1996).

Regulatory frameworks also provide an influential input into the ability to make decisions and the procedures and protocols for management and assessment on which decision-making is based. They determine what is legally required in terms of the behavior of actors and are shaped by cultural norms. These regulatory frameworks can be both formal (legal) and informal (enforced through society but not legally required) and can be dramatically altered through the feedback mechanism from the risk governance process.

4.4 DRR output and feedback mechanisms

What is indeed of key interest and what merits further explanation is the decision feedback mechanism (D_F), which occurs from the risk governance process to the changing risk inputs. The simple explanation of this feedback mechanism is that the actions taken and decision pathways pursued in the risk governance process influence the continuity or discontinuity of the changing risk inputs. This occurs for example for I_S with respect to the continuity of actors, progress toward a safety culture, alteration of laws, etc. An example of this feedback for I_P occurs through the decision-making influence on man-made alterations to the natural and built environment as well as to potential contribution to creating, exacerbating, or reducing anthropogenic triggers. Additional influence can be made to the presence and concentration of people (contributing to an increased or decreased number of people at risk and potential for loss of life).

An additional set of arrows is present facilitating movement from the process to the output of the system and a feedback from the output to the process. The output is chiefly disaster risk reduction by means of the risk governance process and its inputs undertaken at each part of the disaster risk cycle (prevention, preparation, response and recovery). This relationship is evident through the equation given in this final part of the system as it represents how disaster risk reduction is the result of the risk governance process as a function of each phase of the disaster risk cycle. The "success/failure feedback" mechanism is based on the level of success achieved within this cycle in terms of efforts taken to reduce disaster risks (see also connection to "good" governance in "success/failure feedback" in next paragraph). The level of success may alter policy agendas and may encourage a

of individuals, communities and organizations toward risk and risk decision-making (Assmuth et al. 2010; Little 1991; Renn and Walker 2008).

change of strategy in the case of failure.

A specific note must also be made for the “good” governance component as it pertains to the presented conceptual framework and “risk governance system”. This component can be considered as the intangible and “hidden” part of the framework that assists in trying to achieve and work toward end goals (the desired level of disaster risk reduction). A key point, and indeed assumption of the research, is that maintaining principles of “good” governance within the processes carried out in the governance of risks contributes to the success (or failure) of the feedback mechanisms. This is a point that is not explicitly presented in the visualization of the risk governance system and reflects the often “intangible” characteristic of these principles. Although this absence could be seen as a critique to the present conceptual framework, it is an issue in which this thesis attempts to find clarity and build understanding through connection to policy and practice in specific localities via case study and cross case analysis.

4.5 Connection to research goals

In explaining how the conceptual framework supports the research focus, it is first necessary to state that a simplified conceptual understanding was needed in order to better grasp the concept of risk governance itself and how this plays out in terms of what the processes of risk governance are, what feeds into these processes, and what do these processes attempt to produce (what is their purpose). Throughout the design of the conceptual framework, it was also necessary to attempt to understand application beyond scientific dialogue and to also consider how this system operates in practice and can operate within the different contexts. The creation of this conceptual structure, given this attempt at understanding, helps also enable a comparison baseline, as the same relationships demonstrated and explained within this framework are assumed to exist within all risk governance systems (regardless of context). However, this provides only an understanding of a system and not necessarily how the system functions in practice. The research assumes that the ability of in-practice functions depends largely on context. Investigating this claim with the given understanding, supports the effort toward achieving the main aim of the research: *provide reflections and recommendations for strategies and practices that are commonly applicable as well as those elements that have to be tailor-made for the local context of each case study analyzed.* The conceptual framework also sets the tone for the research objectives used to break down the main aim by forming a baseline understanding of what should be considered in understanding risk governance and its processes (**Objective 1**), what can one comprehend as the components of changing spatial context in and from which these processes take place (**Objective 2**), and what these processes generally try to achieve. With these considerations in mind, the research attempts to take the analysis further by

operationalizing this understanding in different cases (**Objective 3**), providing different spatial contexts and deriving a reflection on commonalities, singularities, and general recommendations for future policy and practice development (**Objective 4**).

Chapter 5

Preliminary fieldwork and analysis

This chapter presents the preliminary fieldwork and includes both the practical applications of this work and connections to theory development. The practical part of this preliminary fieldwork is first explained through Section 5.2 on the observational protocol and fielding questions. A brief overview of the preliminary findings and analysis is provided in Section 5.3. The connection to the theoretical side of the preliminary fieldwork is provided in Section 5.4. In this last section, the development of the categories and interview guidelines are explained. The development of the categories connects directly to the theoretical concepts from which they were developed. Overall, this chapter attempts to highlight the forethought put into the preliminary fieldwork, acting as a vital support to both the primary fieldwork and the general theoretical development within the research approach. The chapter provides further evidence of the integration of the practical, or bottom-up, part of the approach and as well as the connection to theory.

The preliminary fieldwork, or first stage, was pursued in an effort to establish a basic understanding of the case study settings and context. This prepares the researcher with important inputs from which to base the appropriateness of different methods for the primary fieldwork that can be used to try to understand how risk governance processes play out in practice. The first of these efforts can be found in the observational protocol that was used for stakeholder group meetings during the initial field site visits.

5.1 Observational protocol and fielding questions

The observational protocol is an important tool that can be used especially in exploratory field research and permits the recording of multiple observations through a loose structure. It furthermore presents a planned approach for data recording in the field (Creswell 2009). The results obtained from the information gathered for the observational protocol serve as a basis for the analysis of the exploratory fieldwork and connect directly to research **Ob-**

jective 2 *Establishment of what is the spatial context in which risk governance processes occur within each case study area through both desk study research and fieldwork.* This objective is, as described in Chapter 2, in part achieved through fulfilling the goals of the observational protocol.

The Observational Protocol The protocol developed within this research approach borrows both from Yin (2009) and Creswell (2009).¹ It provides a structure for understanding and utilizing field observations within the research topic and consists of two parts. The first part of the protocol provides four goals which establish the purpose of the field visits and stakeholder meetings. Field visits consisted of taking a physical tour around the town and the affected area, permitting an *in situ* observation opportunity within the surrounding environment for each of the case study sites. Stakeholder meetings were organized by partner organizations through the CHANGES project and, in nearly all cases, provided a group setting in which to ask preliminary questions. Four goals that were pursued through both the field visits and stakeholder meetings are as follows:

- 1) to gain an understanding of the physical environment,
- 2) to establish initial contact with stakeholders (at multiple levels when possible),
- 3) to establish what is the most appropriate regional level of analysis, and
- 4) to take notes providing input toward identifying the specific risk culture of the case study site.

Aside from the formulation of these goals, the way in which the data was recorded serves as the second part of the protocol structure. Data was recorded according to notation of descriptive, reflective and demographic information (see Table 5.1 for further description of these information types).

Notes Category	Category Description
Descriptive	dialogue notes, physical setting, activities
Reflective	personal thoughts and inquiries (i.e. inquiries, impressions and ideas)
Demographic	field setting, time, place and date

Table 5.1: Description of Observational Protocol notes. The table is derived from p.181-182 of Creswell (2009).

These are used to help sort evidence used in achieving each of the four goals. Raw notes were written in the field, typed and then separated into the notes categories above. After

¹ Readers are encouraged to consult pages 79-82 in Yin (2009) and pages 181-182 in Creswell (2009). Though the Yin reference is more related to completing a case study protocol, the researcher can draw from this to better inform his or her observational protocol development.

reflecting on these categories, the descriptive and demographic notes were used for the first goal. The second goal was established through participation in the meetings and by recording contact information. The third and fourth goals were addressed through the descriptive and reflective notes. This structure (protocol goals and information types) was used for all case study sites and provided a method of comparison for the initial empirical work.

Stakeholder group meetings and preliminary field visits

Field visits and stakeholder meetings in which the observational protocol was used were completed within the year 2012 during the following dates:

- March 31st to April 4th (Fella catchment, Friuli-Venezia-Giulia region, Italy)
- April 16th to April 20th (Barcelonette catchment, Alpes-de-Haut-Provence, France)
- June 11th to June 15th (Wieprzówka catchment, Małopolska Voivodeship, Poland)
- Sept. 17th to Sept. 19th (Nehoiu catchment, Buzău County, Romania)

During the field visits, photos were taken and notes were made with respect to achieving the observational protocol goals. The stakeholder group meetings permitted the ability to ask basic questions. The research terms these “fielding questions” as they are highly exploratory in nature and generally very open. These preliminary questions were based on the literature reviewed at the time of the field visit and were organized with fellow researchers from the CHANGES project. The reason for this co-organization was to avoid overwhelming the stakeholders with a list of questions from multiple researchers and to avoid the need for repeated meetings. Consequently, some questions were not as directly relevant for this particular research approach; however, the meetings still afforded the opportunity to directly ask important questions in trying to better understand the risk governance processes at the local and regional level. These questions included those provided in Figure 5.1. Effort was made to ask these same general questions during each meeting, within each case study.

Of important note is that all stakeholders gave a general introduction at the beginning of the meeting about who they are, their organization or affiliation, and what are their primary responsibilities. This provided an essential input in addressing goals 2 and 3 of the protocol.

Attainment of Observational Protocol goals (1-3)

1) To gain an understanding of the physical environment

The attainment of this goal is based on the many pictures taken and notes recorded on the physical characteristics of the case study sites. The notes recorded also include dialogue from stakeholders concerning how they view their physical environment. The response to

<p>General information about the local physical environment (Goal 1 related): What is the current situation in your area related to hazards? (please describe)</p> <p>Communication with the public (Goal 2 & 3 related): Does your organization interact with the public? If yes, what kind of methods of communication do you use with the public?</p> <p>Related to decision-making (Goal 2 & 3 related): Who is the final decision-maker when making decisions on risk reduction measures during peace time?</p> <p>Understanding risk perception (Goal 4 related): How do you consider or determine what is an acceptable risk? Concerning risk reduction measures, which do you feel receives more attention: prevention/preparedness (pre-crisis efforts) or recovery (efforts after the crisis has occurred)?</p>
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Figure 5.1: General questions asked during stakeholder meetings for preliminary fieldwork

this goal is expressed in Table 5.2 to represent the dialogue from stakeholders with respect to the hazard(s) which they feel is (are) more important in their area. It is noted that, in some cases, the sense of urgency for a particular hazard type varies depending on the local geography even within a single case study site.

2) To establish initial contact with stakeholders (at multiple levels when possible)

The second goal was achieved through the effort to contact stakeholders at both local and regional levels (multiple vertical levels). Effort was also made to try to contact stakeholders in different types of relevant organizations (multiple horizontal levels). An annex is provided with more detailed information on who was contacted, their affiliation and levels (please see Annex 1). A list was created providing the contact information and basic description of the stakeholders that were met during the initial field visits. This served as an important basis to use and expand upon for the primary fieldwork.

3) To establish what is the most appropriate level of analysis

To address this goal, the question was asked at what level is there a concentration of resources to handle and coordinate a local event. The information used to address this goal was comprised of notes identifying who, where, and what level is the entity that takes initiative and organizes resources. More specifically, it was of key importance to identify who or what entity has adequate resources to manage local events. It was, furthermore, necessary to distinguish characteristics and qualities of the local and regional level in terms of how they operate and what level makes up the most appropriate level of analysis as a result of this. In identifying the responsible entity, it was clear in the Romanian case study

that resources and coordination were primarily handled by the county level even for local flash flood events. For Poland, it was also plain that the district level is the most appropriate level though some municipalities enjoy adequate resources and autonomy to handle almost all local events. In the case of Italy, primary reliance is on the civil protection at the regional level. This was observed to be similar for the French case study through the coordination and resources managed by the prefecture level.

4) *To take notes providing input toward identifying the specific risk culture of the case study site*

The fourth and final goal is expanded within the next section of the analysis. It was realized during the stakeholder meetings and field site visits that additional information was provided to identify general factors for comparison, issues identified, and some good practice examples. The fourth goal and this additional analysis is analyzed separately from the first three goals, as it is more complex and demanded further research and elaboration.

Observational Protocol Goal (1-3)	French case	Italian case	Polish case	Romanian case
1. Understanding of physical environment	Both landslide and flooding important (also earthquakes due to recent events in Feb. 2012)	Both landslide and flooding important	Flooding most important (fluvial, urban and flash floods) Type of flood depends on geographic location	Flash flooding most important in local areas e.g. Nehoiu. Landslides important all over
2. Levels of contact with stakeholders	Local and regional levels contacted in all cases (some cases have more local representation than others)			
3. Most appropriate level of analysis	Regional (prefecture)	Regional (region)	Local/Regional (district)	Regional (county)

Table 5.2: Observational Protocol Goals (1-3). The table contains a brief overview of the responses to the first 3 goals of the protocol.

5.2 Preliminary analysis and key findings (brief explanation)

The analysis of exploratory fieldwork and site visits data was broken up into the following: general strategy comparisons, unique factors, issues identified, and good practice examples. Factors and examples listed within this analysis were based on themes that emerged within the stakeholder dialogue as well as the reviewed literature (see Chapter 3 for reference). Emphasis was placed to a greater extent, however, on the former data source. These themes were then created into a coding system and were used to code notes from stakeholders' dialogues and field visits using MAXQDA software. The factors presented were a result of the exploratory research and were consequentially taken into consideration as the research progressed and when the primary empirical work was conducted the following year in 2013.

The preliminary results have been incorporated into the final case study chapters and are therefore not provided within this section as to avoid repetition of presented results.

5.3 Development of categories and interview guidelines

This section turns to the more conceptual-based component of the research approach. The development of categories and interview guidelines are the focus of this section, and provided direct connection to **Objective 1**: *characterization of what is good risk governance*. As part of the first phase of addressing this objective, a series of themes, or indicator categories were developed primarily based on the White Paper on European Governance (CEC 2001), the UNDP “Governance for sustainable human development” policy document (UNDP 1997), the past EU-funded Framework Programme project MIDIR (see MIDIR project via Greiving et al. 2007), and the work of the International Risk Governance Council (IRGC 2006, 2008). Additional, supporting sources included also the following: material from the Institute of Governance in Ottawa, Canada (Graham et al. August 2003), from the World Bank Institute Urban and City Management Program (Fonseka 2000), the International Federation of Surveyors (IFS 2006), and the British and Irish Ombudsman Association (BIOA 2009). The purpose of these categories was to determine what principles of “good” risk governance are and how to operationalize these in an analysis of risk governance strategies within the four CHANGES case studies.² Each of these categories was chosen based not only on their mention and elaboration within the initial desk study documents, but also on their applicability to elements of the conceptual framework and in-practice decision-making processes. The reader is encouraged to consult Annex 3 for the process of developing the initial set of “good” risk governance principles and to note that the category of Risk Culture was developed at a later stage than the other 12 categories.

With regard to **Openness & Transparency**, this category was chosen due to its importance demonstrated through connection to building trust and establishing legitimacy of decision making processes and outcomes as well as to assisting in reduction of information asymmetries (uneven knowledge distribution), uncertainty (lack of knowledge of some actors), and in some cases, reduction in ambiguity (different interpretations of risk assessment data).

Accountability was chosen based on importance revealed in terms of avoidance of problems due to fragmentation of roles and overlapping responsibilities as well as issues related

² “Good” is here used in parentheses as this the research considers a primarily Western context in terms of the analysis. This is not to be interpreted as a limitation of the research implications to only Western societies, as results may provide considerations for universal application.

to lack of monitoring activities for decision-making processes.

The category of **Participation** was chosen due to its role in the incorporation of local knowledge via involvement of the public and trust-building between actors and with the public, especially in terms of establishing legitimacy of the decision making processes.

Strategic Vision became a category in its own right as it proved important in how risk governance strategies work toward an end goal as well as its importance in relation to ambiguity in the case that consensus of a strategic focus is non-existent.

Effectiveness was chosen as it highlights the discrepancies between in-practice and legally defined strategies as well as whether regulatory frameworks are effectively enforced. It is understood within this category that strategies must go beyond design and work toward successful implementation.

Initial consideration and eventual selection of **Efficiency** as a category came to fruition based on its relation to both physical and institutional capacities as well as the power distribution between vertical levels in terms of decision-making abilities.

Equity was chosen based on its importance in connection to intra-generational equity, spatial solidarity and environmental (in)justice.

The category **Feasible & Sustainable** was chosen as an initial category based on its connection to assessment of given capacities and the need for sustainable solutions to a changing environment as well as to connections to the need for intergenerational equity of strategies employed. This category, however, proved to have substantial overlap with many other categories. The significance of this overlap determined there was no merit to selecting this as a category in its own right but to rather reallocate the overlapping parts into other categories (e.g. mainly to Strategic Vision and Equity).

Trust was a decidedly important category due to its connection to the legitimacy of actions taken and decisions made as well as in encouraging successful communication between and among both public and non-public actors. This is also related to past experiences with authorities. Importance is stressed in having this as a separate principle. While the IRGC does not do this but rather integrates this as part of the other principles, the research at hand maintains an understanding that issues (one may say even risk governance “deficits”) related to trust cannot be solved only through openness and transparency and accountability. These do not necessarily equate to trust. In the long term these other principles

may create trust, but the current state might be different.

Resources was chosen as a category though it is not found in the majority of the texts analyzed. The use of this term is based on the importance highlighted in the previous EU Community funded project, MIDIR. Resources relates directly to capacity via knowledge or lack thereof and physical capability within available means. This, furthermore, was chosen based on its importance in relation to identifying that which enables (or lack thereof which disables) capabilities to manage and assess risks.

Coordination was selected due to its importance in understanding and assessing the interactions between different actors and between actors and the public as defined by legal requirements. This relates also to participation of the public as well as to effectiveness of current regulations.

The category **Cooperation** was chosen as it assists in understanding and assessing the informal interactions between different actors and between actors and the public. This also relates to participation of the public.

Risk culture was chosen as the final category and was left as the most open and exploratory of all categories. The initial understanding of this category and the logic toward its use lies in identifying characteristics of cultural norms. This, however, was not an end in itself. The purpose of this consideration was to provide a better understanding of how overall risk governance strategies vary amongst different spatial contexts, and further supports the need for tailor-made approaches.

After the initial construction of the categories and ideas for potential indicators were drafted, questions were created in order to develop semi-structured interview guidelines. The questions were developed according to each “good” risk governance category. Additionally, questions attempted to purposefully incorporate elements of the risk governance deficits developed by the IRGC (IRGC 2009). Thus, a combination of universal principles of good governance, as well as that which is more specific for risk governance (and oft occurring issues found in risk governance strategies), formed the foundation of the semi-structured interview guides and consequently the filter through which empirical data was gathered.

Interview guidelines were created via the following process: from “good” risk governance principles to indicator categories, and then on to question development and guideline structure and finalization (see Figure 5.2).

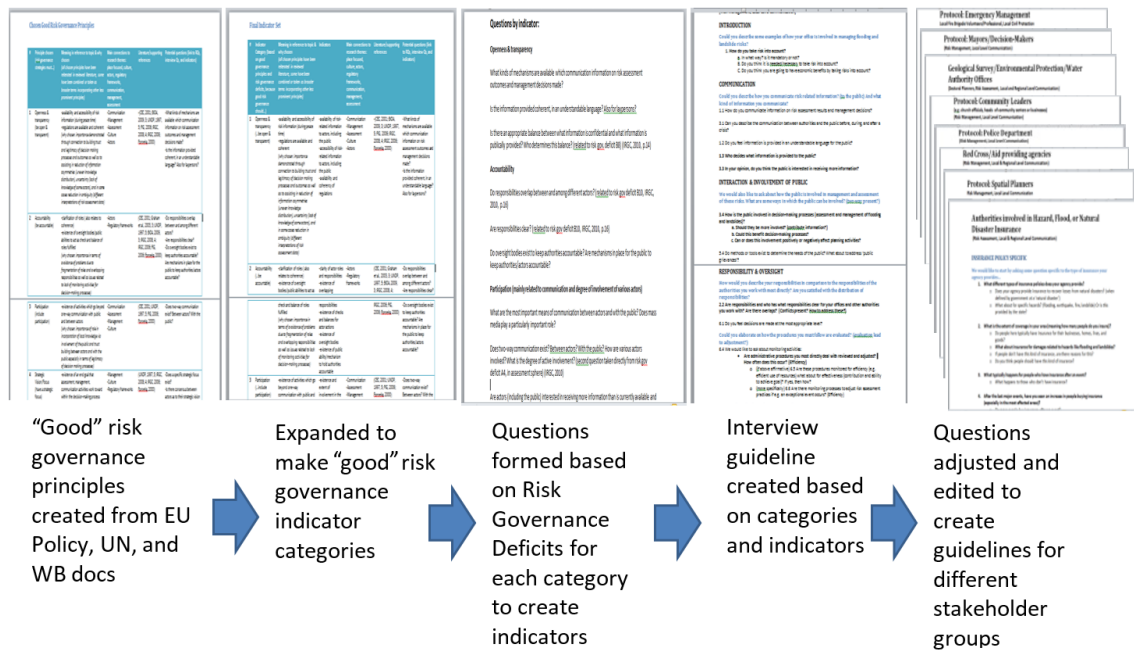


Figure 5.2: Process of interview guideline creation

Questions in each guideline were similar but differed slightly in content and sentence formation depending on the addressee. Determining the addressees was also a process in itself that is further explained within Chapter 6. In short reference, stakeholders contacted and met during the preliminary field work in addition to networking with local partners and greater desk study research yielded a list of the types of “key informants” that were ultimately interviewed for the primary fieldwork (readers are encouraged to see Chapter 6 for greater elaboration on “key informants” and the outcome of representation). The differences in these guidelines thus generated a set of guidelines unique to different key informant types. For clarity purposes, Annex 2 provides the relevant questions asked per indicator category, the informant type questioned, and connections to risk governance deficits. The questions were broad enough to allow applicability to more than one indicator category. Figure 5.3 contains the abbreviations given for each key informant type.

The abbreviations demonstrate a range of different informants and provides their most apparent connections to the different main components of risk governance (risk assessment, risk management, and risk communication) at local and regional levels. In the case that “local” or “regional” is not stated, it is assumed that both levels are represented. The purpose of listing the types who were asked each question is meant to communicate that attention should be paid to the appropriateness of the questions asked and their addressees with respect to the roles and responsibilities of the addressees. The description of the creation of these guidelines transitions well into the next chapter, in which the purpose of

M:	Mayors/Decision-Makers, (Risk Management, Local Level Communication)
S:	Spatial Planners, (Risk Management, Local Level Communication)
C:	Community Leaders, (Local Level Communication)
RA:	Red Cross/Aid providing agencies, (Risk Management, Local & Regional Level Communication)
P:	Police, (Risk Management, Local Level Communication)
EM:	Emergency Management, incl. Fire Brigade Volunteers/Professional, Civil Protection, (Risk Management, Local & Regional Communication)
I:	Authorities involved in Hazard, Flood, or Natural Disaster Insurance, (Risk Assessment, Local & Regional Level Communication)
SEC:	Geological Survey/Environmental Protection/Water Authority Offices, Sectoral Planners, (Risk Assessment, Local and Regional Level Communication)

Figure 5.3: Abbreviation for key informant types

the interviews and the interview process is explained with respect to the overall research approach.

Chapter 6

Primary fieldwork

This chapter provides an explanation of the primary fieldwork and how it was conducted. The work builds on that which was collected in the preliminary field work and the initial development of the theoretical concepts. The chapter discusses the purpose of the interviews (Section 6.1) and then the interview process itself (Section 6.2). In explaining the purpose of the interviews, a description of the representational goals is provided and elaborated. This section, furthermore, describes the different stakeholder types and levels used in trying to reach representational goals. A detailed account of the transcription process is also given (Section 6.3), especially in order to provide a clear communication of the steps taken between receiving information from the interview participants and the processing of that information into a usable medium. This chapter also provides a list of different difficulties that were encountered in this part of the research approach and the efforts to try to overcome them in the field (Section 6.4) before transitioning to the final development of the category and indicator system used to analyze and compare the primary fieldwork transcripts and supporting preliminary work.

6.1 Purpose of the interviews

The purpose of these interviews is to gain an on the ground understanding of in practice strategies and the issues thereof with respect to the different key theoretical concepts identified for “good” risk governance. The first part of this purpose (gaining the on the ground understanding) supports the achievement of **Objective 2** *Establishment of what is the spatial context in which risk governance processes occur within each case study area through both desk study research and fieldwork*. The information, and especially the perspectives, gleaned from these interviews provides insight into the local and regional level context for each individual case. This is particularly true of information concerning the in-practice functions of key actors, their regulatory frameworks, and the norms, beliefs and values that influence their decision making processes and also helps provide the basis for

the cross case analysis. The evidence gathered and analysis thereof for the investigation across cases addresses **Research Question 2** *Do the key actors and the distribution of their roles and responsibilities differ among the study sites?* (through information gathered about issues pertaining to actors and their responsibilities); **Research Question 3** *Do the most relevant regulations (both formal and informal) which make up the policy framework for disaster risk management dramatically differ?* (through information gleaned regarding regulatory framework issues); and **Research Question 4** *Are there important cultural factors which influence risk decision-making processes (e.g. aspects of political or organizational culture)?* (Through information gained from perspectives, especially about norms and values).

The second part of this purpose (understanding in practice strategies with respect to “good” risk governance) assists in reaching **Objective 3** *Operationalization of risk governance through use of an indicator system to establish the basis of analyzing the empirical work in each study area.* The gathering of information for the primary fieldwork through these interviews supports the development of the category and indicator system by providing a greater empirical evidence base. The analysis of the data collected using this system, furthermore, provides the necessary inputs for conducting case analyses and supports addressing **Research Question 1** *Do strategies and practices therein reflect “good” risk governance principles?* The analysis of this data contributes to the overall practical part of the research and comprises the bulk of the substantial empirical input for the final analysis of the research. The account of how the interview data is analyzed in final form and results of this analysis are provide in Chapters 9 onward, while with the development and finalization of the analysis tool (i.e. the category and indicator system) itself is provided within Chapter 7. The gathering of the interview data occurred in the year 2013 within the following timespans:

- April 14th to 27th (Fella catchment, Friuli-Venezia-Giulia region, Italy)
- May 12th to 25th (Nehoiu catchment, Buzău County, Romania)
- June 22nd to July 13th (Barcelonette catchment, Alpes-de-Haut-Provence, France)
- Aug. 22nd to Sept. 8th (Wieprzówka catchment, Małopolska Voivodeship, Poland)

Prior to the departure and the gathering of information during the above dates, goals were set in order to determine how to achieve adequate representation of the different stakeholders involved in risk governance processes. These goals were based on a need to include multiple vertical levels as well as a wide range of entities within similar horizontal levels of governance and were set as follows:

- 1) Representation of both local and regional level stakeholders

- 2) Minimum of 15 stakeholders total per case study
- 3) Reach as wide an array of different stakeholder categories as possible

In setting these goals, and in understanding the different types of actors and stakeholders involved in different processes for the assessment, management, and communication of risks, it was necessary to draft a list of different types of stakeholders both at regional and local levels. The focus on these levels was due to the nature of the research, a pursuit which investigates on the ground practices and strategies.¹ The creation of this list was supported by the general literature research (see Chapter 3), internet and literature research specific to each of the case study sites, and the preliminary understanding achieved in the first phases of fieldwork (see Chapter 5). The lists for both respective levels are provided in Table 6.1. These lists acted as a guidance in the pursuit and selection of key informants. The key informants, furthermore, were the individuals chosen based on the nature of their involvement and their placement and responsibilities within their community. It is also important to note the understanding of “regional” and “local” within this research is based on the selected administrative levels within each of the case study sites. There are different delineations of a “region” within the European Union’s member states. For example, “region” in the case of this research does not necessarily equate to the “Régions” of France, nor does it equate to the “Development Regions” of Romania. The selection of “region” is based on the selection of the most appropriate sub-national level supporting and administrating multiple local level entities within each case study, which acts as a more supra-local level. The term “local” does not refer to the “villages” found in Poland, or “hamlets” in Italy. It rather refers to a self-governing administrative level that is also a subunit of the regional level. The selection of the local entities investigated within this research is explained in greater detail in Chapter 8, which reflects the importance of specific selection criteria such as the proximity of these entities to the boundaries of their respective catchments.

The list of regional stakeholders is longer than that of the local level for a number of reasons. The first is that often there are the same kinds of stakeholders at the regional level as there are at the local level (e.g. similar administrative structures across vertical levels of government). However, at the regional level there tend to be more coordinating entities than at the local level. This is also due to the fact that the local level that is under consideration often does not have the kind of resources necessary to have the same coordinating bodies as the regional level (e.g. no professional fire service at the sub-county level in the Romanian case). In other cases, this can be due to the general administrative structure and the fact that the very local levels are relatively small, requiring a pooling of funds and resources to generate coordinating bodies across these local entities (e.g. the

¹ Though the entities and operations at the national level are considered, they are referred to more as important background information supporting a better understanding of the sub-national levels.

Stakeholder types represented (local)	Stakeholder types represented (regional)
<ul style="list-style-type: none"> • Mayors/Local Administrative Offices • Municipal Technical Officers • Community Leaders (e.g. church officials, heads of community centers or businesses) • Planners within Municipality Offices • Local Fire Brigade Volunteers/Professional • Local Civil Protection/Emergency Management • Environmental Protection Authority (local officer) • Police (local) • Private Planning Firm (e.g. includes architects and institutes contracted by municipalities) 	<ul style="list-style-type: none"> • Regional Administrative Offices • Regional Civil Protection/Emergency Management • Regional Planning Authorities (e.g. government office) • Regional Water (Basin) Authority • Geological Survey Offices • Academia/Scientists • Environmental Protection Authority • Forestry Authorities • Red Cross/Aid providing Agencies • Authorities Involved in Hazard, Flood, or Natural Disaster Insurance • Police (regional)

Table 6.1: List of stakeholder types involved in risk governance processes at the local and regional levels.

creation of the Communauté de Communes Vallées de l’Ubaye (CCVU) in the French case to coordinate amongst the different local communes along the Ubaye Valley).

During interviews, overlaps between the different types became evident. Though these depended on the case study, in multiple cases the local fire brigade and local civil protection interview guides were merged. Another point must be made with respect to coverage of the general public. It was not possible within the limits of this research to reach all of the general public (or even to reach a certain percentage). This was not pursued particularly because using key informants allowed for similar types of stakeholders to be requested for an interview and enabled input from these similar types across each of the case study sites. This also helped permit a better comparative structure amongst the cases. However, as within any governance process, the public is a key actor and must be represented. As a “key informant” for the local people, the stakeholder type “Community Leaders” was created. This serves as a proxy for the perspective of the local population. These included people who maintain a prominent role in their community such as church officials, heads of community centers, and heads of local organizations or businesses. One, perhaps weakness, of the representation and types of stakeholders listed is that the media are not included. This was an issue that was realized post primary fieldwork but represents an important potential for further research and enhancement of the current work. Previous research has also been conducted addressing the public perception directly in both the French and Italian cases, with some degree of coverage also regarding the role of the media.

Particularly with respect to the French case study, readers are encouraged to consult the work of Dr. Marjory Anginard (completed within the 6th Framework Programme project Mountain Risks), which focused to a greater extent on public perception and presents results of a representative survey sample of the local level public perception (see Anginard June 2011). The research presented within this thesis acknowledges and attempts to advance the work of Anginard, as well as the work of Dr. Bruna de Marchi and Dr. Anna Scolobig (conducted in the 7th Framework Programme project, CapHaz-Net as well as the 6th Framework Programme project FLOODsite), with respect to the Italian case study. This previous research also addresses the public and media sphere, focusing on risk perception at the level of the public (see Scolobig et al. 2012 for an example of research from FLOODsite, see Kuhlicke et al. 2011 for an example from CapHaz-Net).

In using the proxy “Community Leaders” in addition to accessing a range of types, the research attempts to reach a wider spectrum of perceptions on how different key actors involved in risk governance processes view these processes, what they identify as patterns of positive practice, and what they identify as deficits or areas for improvement. Conducting these interviews not only helps in establishing this understanding but also amasses knowledge with respect to the values these individuals place on key parts of management, assessment, and communicative practice and in the overall decision-making structures and actions taken. What is of key importance is for the researcher to also take into consideration the understanding these individuals have within their given context (Forester 2006). In the interview process, this helps assist in identifying norms, goals, and competing views, helping the researcher create a synthesis of normative perspectives to better decipher what is held in consensus and what are the basic points of argumentation (Fischer 2007). The interviews employed in the research structure echo what Roe (1994) states as the ideal procedure in case study and interviews: utilizing free range storytelling, open-ended interviews, and a case study approach to determine how policy problems (in the governance of risks) are identified and discussed and to enable pattern matching and connections across interviews as well as to reveal key point conclusions (Roe 1994).

6.2 The interview process

The selection of key informants was very time consuming and involved a high level of organization. This was assisted through the help of project partners in each of the case study sites. This was further made possible via in-depth internet research on various government websites and networking from previous exploratory field visits. The images below provide a brief glimpse of the logistics and key informants list for each of the case study sites (see Figure 6.1).

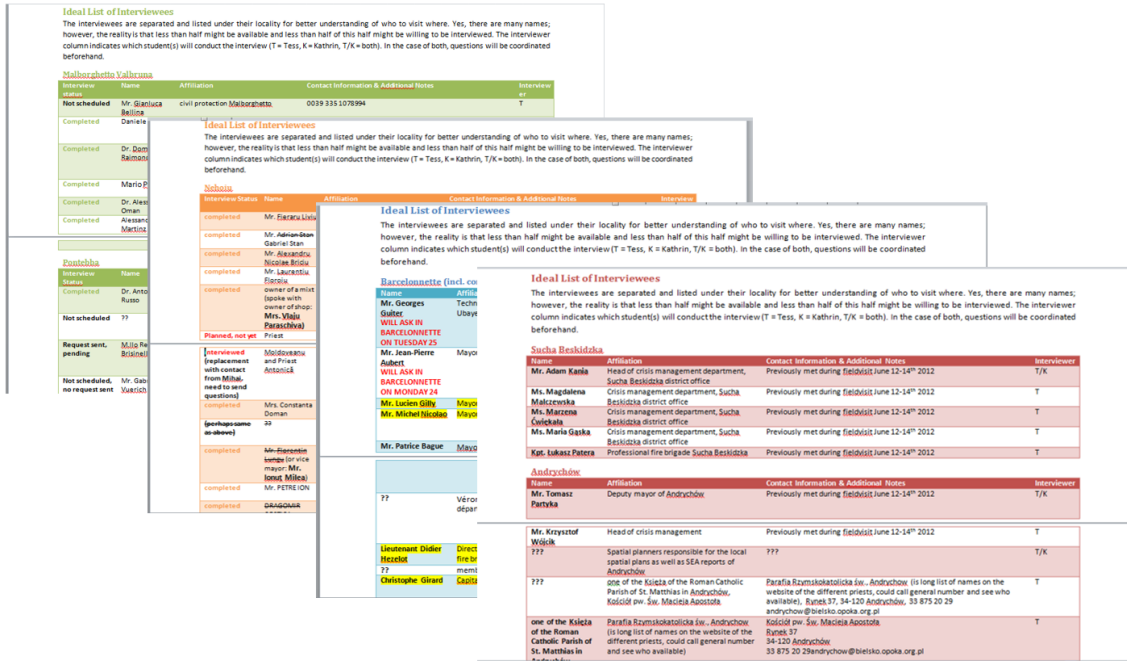


Figure 6.1: Logistics and key informant lists for each case study site

Informants were contacted primarily through email and sent interview requests. The request was sent in the form of an official letterhead. An example of this letterhead template can be found Annex 8. All request letters were personalized (with the specific name of the requested informant) and were translated into the native language of the informant. The letter explained the purpose of the interview and use of the information received. It gave an approximate time estimate of one hour for the duration of the interview and requested potential dates for when the interview would be conducted. Contact information was also provided to the informants in case they had any questions or concerns. Reference was also given to the EU project providing funding for the research as well as reference to the institutes of the interviewers and the case study partner institutes assisting this research. An attempt was made to send an official request letter to all potential informants, in some cases it was necessary to contact informants by phone, and in still other cases some informants were contacted during the fieldwork via impromptu “snowball effect” (in which case, one interviewee would recommend and contact or provide contact data for another potential informant). In all cases permission was asked for recording the interview, and in nearly all cases this permission was granted. A thank you letter was sent via email to informants after returning from fieldwork. All, again, were sent in the native language and personalized (please see Annex 7 for example thank you letter content). Though translation into the native language required additional time, and additional cooperation and assistance from native speakers and case study partners, this was necessary to ensure that the informants participating in these interviews were aware and able to understand the

interview requests, the purpose of the interview and data use, and the appreciation (thank you letters) for their time invested in this research.

The response to the interview requests permitted the opportunity to meet the representational goals. A breakdown of the number of interviews, informants, and informant types and their distribution is provided in Table 6.2.

	Fella River catchment in Friuli-Venezia- Giulia region (IT)	Nehoiu catchment in Buzău County (RO)	Barcelonnette catchment in Alpes des Haute Provence (FR)	Wieprzówka catchment in Małopolska (PL)	Total
Interviews	22	27	26	25	100
Informants	23	30	28	34	115
Types	22	27	26	30	105
Type Distribution	13	16	10	17	(all)*

Table 6.2: Number of interviews, informants, informant types, and their distribution by case study site and total

The table excludes informal discussions and previously conducted exploratory stakeholder meetings. “Interviews” refers to the total number of interviews (meetings with informants for discussion) regardless of the number of persons present. “Informants” refers to the number of individual persons that were met (e.g. one interview may contain more than one stakeholder who is present). “Types” refers to the number of categories represented by all those individual stakeholders that were present in the interviews. In the case of a group interview, it is possible that multiple types are present within a single interview (e.g. the head of the volunteer fire brigade and the mayor were present in the same meeting in Stryszawa). “Type distribution” refers to the total number of different categories represented. This gives an idea of the range of types interviewed. In reflection of the numbers overall, there were far more interviews conducted than originally hoped for and all goals for the number and range of informants have been met. The first goal regarding representation of both local and regional levels was achieved in all cases. This is visualized in Table 6.3.

In all cases it was possible to meet more local stakeholders than regional, with the exception of the Romanian case. The reason for this is that there are a far greater number of actors at the regional level with the resources available to grant action and decision-making powers than at the local level (in contrast to Poland, for example). In the French case, this trend also appears to be biased toward greater local level due to the high responsiveness and number of community members interviewed. In total, however, there is a fairly even

	Fella River catchment in Friuli-Venezia-Giulia region (IT)	Nehoiu catchment in Buzău County (RO)	Barcelonnette catchment in Alpes des Haute Provence (FR)	Wieprzówka catchment in Małopolska (PL)	Total
Local	22	27	26	25	56%
Regional	23	30	28	34	44%

Table 6.3: Distribution of the representation of the local and regional levels in each of the case study sites and in total

representation between the two levels overall.

The second goal was met through the fact that there were more than at least 15 informants for each case study site. The third goal was met through the efforts made in trying to reach as wide a representation of different stakeholder types as possible. This is made evident in consideration of the numbers shown for the type distribution (at least 10 different types of key informants in each case) and in consideration of the distributions between local and regional (close to 40% representation, or more in most cases, of both levels). The differences in the distributions are attributed to availability and willingness of different informants as well as the differences in the risk governance systems within each case study. This means, for example, the actors (and concentration of key actors) are not necessarily the same from one case study to another or that the same actors might also exist but the roles of their counterparts in another case study are quite different. Even more explicitly put, in one case one actor is very important; while, in other cases, this actor plays a supporting but not primary role (e.g. the civil protection authorities in the Italian case play a primary role while the civil protection in the French case plays a supporting role). There are also different administrative levels such as the existence of more sub-national levels in some case study sites than in others. Though effort has been made to select comparative levels (see Chapter 8), it is important to note that the administrative levels are also not the same in each case study, adding another layer of complexity in attempting to achieve adequate representation and comparability across cases.

6.3 Fieldwork problems & efforts to overcome

Many problems were identified throughout the fieldwork process, and equally many efforts were made to overcome these problems. A brief overview and description of the problems identified and the efforts to overcome are provided in Table 6.4. One example is the fact that many stakeholders assumed the researcher was looking for only technical answers. An explanation and reassurance was given that this was not the purpose of the interviews.

<i>Problem identified</i>	<i>Efforts to overcome</i>
Many informants approached assumed only technical answers sought	Explanation given that there is no right answer (purpose of interviews is not to fact check)
Some informants do not think they are relevant, especially community members	Additional explanation provided, often via email of the importance of their perspective
Some interviews could not be recorded	Go over notes with interview partners, prompt write up of shorthand notes
Time constraints (for individual interview) do not allow adequate indicator coverage	Questions narrowed and prioritized according to time allotment (try to ask at least one question per category)
Varying comprehension of risk and hazard terminology between informants	Attempt to vary use of terms according to informant comprehension
Inability to reach all informants categories in each site (due to logistic and time constraints)	Prioritization of informants within remaining time
Comparability of actors in different systems	Attempt to compare based on roles and responsibilities. Use of common, general questions for comparability

Table 6.4: Problems identified and efforts to overcome during primary fieldwork

Other issues involved limitations that required prioritization within resources; while yet other issues, such as comparability, were met with efforts to find common ground through general questions and responsibility descriptions. Still further, issues were present in the inability to record a small number of the interviews. In these cases, notes were exchanged and content clarifications were made with interview translators and case study partners (often one and the same person). In some interviews it also became clear that there was a variation with respect to terminology (e.g. what the “public” means to one informant may be different to another). This was met through an attempt to first understand what the informant meant by the use of the term, and then an attempt was made to vary the use of terms used in questioning in accordance with the informant’s comprehension.

6.4 The transcription process

The majority of interviews range between 1 to 2 hours. A transcription was made for all interviews in which permission for a recording was granted (nearly all, with a few exceptions with respect to e.g. cases in which a recording was not permitted inside a state or military building). Interview recordings were transcribed into .rtf files using F4 transcription software. This software does not provide an automatic transcription of audio files, but supports transcription through a helpful user interface, enabling better control of the speed and location of audio recordings as the user transcribes the audio themselves. For the process of transcription, a student assistant was hired to help with this due to the du-

ration of and overall large number of recordings. An example of this transcription process is provided in Figure 6.2.

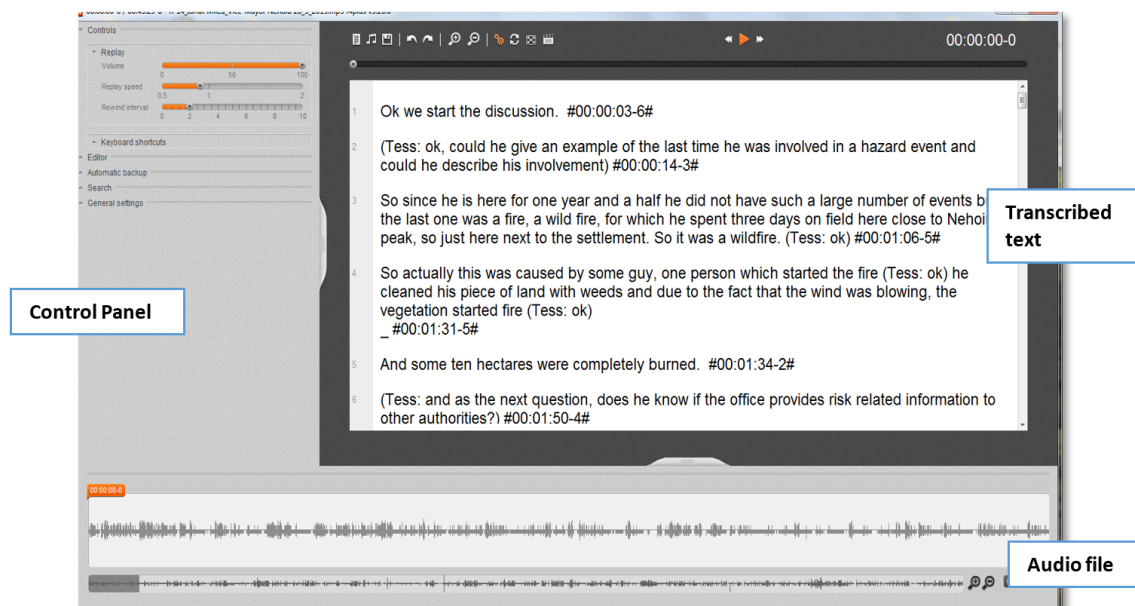


Figure 6.2: Image of F4 software screenshot featuring the transcript of the vice mayor of Nehoiu, Romania

In order to enhance consistency of the transcription process, a transcription guidance document for transcription requirements and information was created and provided for the hired assistant (please see Annex 6 for guidance note document). To encourage greater reliability of the data transcribed, the researcher cross checked the transcriptions for errors that impede content understanding. This was applicable at least for the text in English, and (in some cases) also for the French text. In other cases, it was possible to also consult other colleagues who are native speakers in parts of the transcription where it was uncertain what was discussed. These transcripts were then coded according to the finalized category and indicator system using MAXQDA analysis software (please see Figure 6.3 for visual of this process). The finalized category and indicator system is presented and explained in the next chapter (**Chapter 7 Building the policy understanding**) as the final system was a product of an extensive policy analysis. This policy analysis, and the consequential category and indicator system is, therefore, the subject of the next chapter and is not explained in further detail within this section.

As the visual above demonstrates, transcripts were uploaded and grouped according to case study site and a numeric identifier was given to each individual transcript. The identifier was also tagged with a letter representing from which case study site the transcript corresponds. Transcripts were read through and analyzed. The process of which required

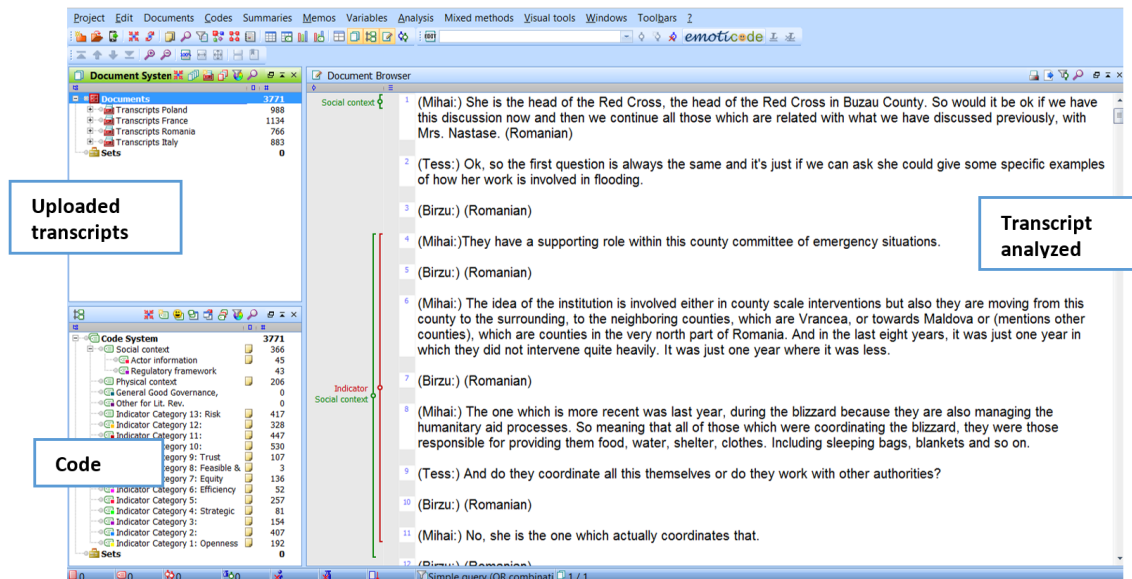


Figure 6.3: Image of MAXQDA software screenshot featuring the transcription coding process

the highlighting and dragging and dropping of transcript text to the category to which they correspond. These categories (the same as provided in Chapter 5) were integrated into and made up the “code” system one can see in the lower left-hand window of MAXQDA. More detailed information regarding the category system is provided in Chapter 7. The results of the analysis of these transcripts using this system are presented within the case study sections of Chapter 9.

A coding validation test was also employed to enhance the reliability of the transcript analysis process in MAXQDA. For this process, a description of each category was provided to the research assistant, who then used this as the basis for coding four transcripts from each case study site. The results of this coding was compared to the coding completed by the researcher for the same documents. A brief review was made of the comparability of the coded segments. The result of this review and comparison procedure indicate that there indeed was significant similarity in the coding results, indicating support for potential replicability of the coding process. In the case that differences in understanding of the categories was evident, a review of this category was made to ensure greater clarity and understanding of its meaning and use. An example of this validation process is provided in Annex 10. This process (the analysis of transcripts and the coding validation test) was conducted in parallel to the policy analysis process, which is explained in the next chapter.

Chapter 7

Building the policy understanding

This chapter presents the policy analysis component of the research approach. It communicates how the policy analysis was developed, from the identification of the macro policy issue at hand to the selection of policy documents to be analyzed, and the process and output of that analysis. The first section details how the objectives and research questions are addressed, highlighting the purpose of why this is an important component of the research and how this helps address the phenomenon under investigation (Section 7.1). The second section elaborates the process of selection of key policy documents, and in one special case, the selection of a global level document (Section 7.2). Within this section, a brief description of the documents and the reason for their selection is provided. In Section 7.3, an explanation of the policy analysis process is provided including an explanation of a further validation process that employed a brief empirical test to support the overall analysis and tool development process. Section 7.4 presents the revised category and indicator system. It provides the definition of each category and a listing of their relevant indicators. The chapter concludes with a brief section on connecting policy theory and practice, particularly as it relates to the topic at hand (Section 7.5).

7.1 Purpose behind policy analysis

In building this policy understanding, the research primarily targets three of the four research objectives. More specifically, the integration of results from the EU policy analysis into the category and indicator system provides policy support on the level that is held in common across all case study sites. It provides the policy evidence base that supports **Objective 1** *Characterization of what is “good” risk governance* according to the understanding established from this common basis. **Objective 4** *Reflection and recommendations for future policy development at EU and case study levels* is similarly addressed, given the direct connection to the use of these documents, the reflection of their use in the capacity to understand “good” risk governance, and the implications for EU policy that can

be inferred from reflection of this use. **Objective 3** *Operationalization of risk governance through use of an indicator system to establish the basis of analyzing the empirical work in each study area* is also directly addressed through the creation of the revised category and indicator set provided as an output of this policy analysis. This revised system serves as a comparative tool used for understanding and analyzing the phenomenon at hand both within and across cases. The simplified flow diagram presented in Figure 7.1 visualizes the process for the category and indicator system development and analysis.

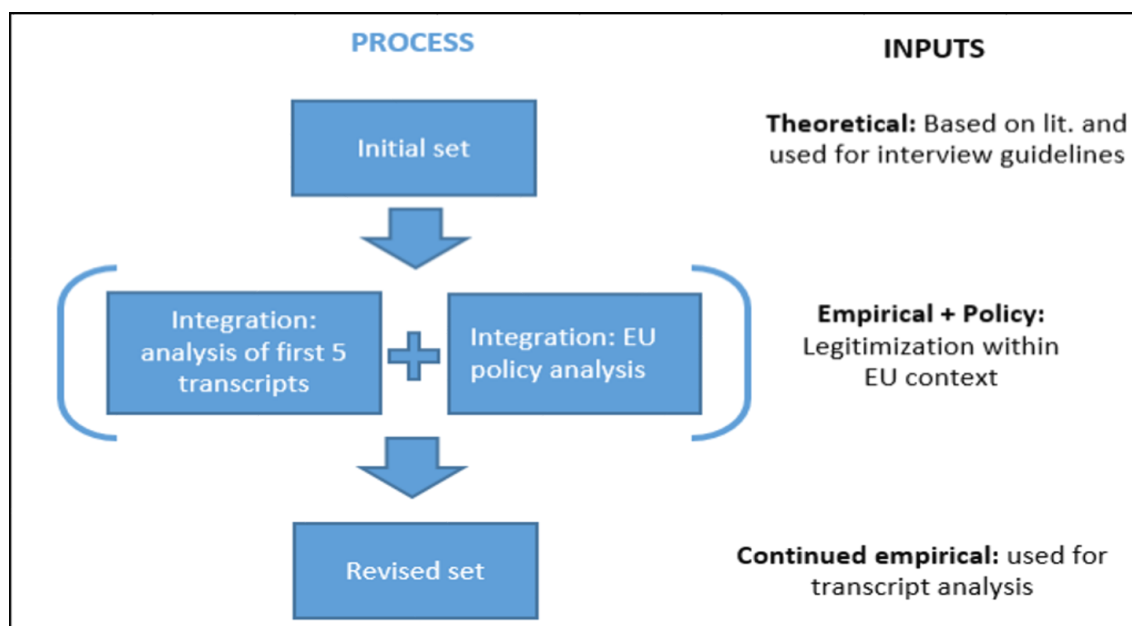


Figure 7.1: Simplified flow diagram for category and indicator analysis

The process started with the initial indicator set which is primarily based on literature and serves as a theoretical input which was used for the interview guidelines (see Chapter 5). This initial set was then revised with empirical and policy inputs (namely from the policy analysis and an analysis of the first five transcripts). The consequential revised set was used for transcription analysis. This set then underwent an iterative process with findings from the transcript analysis. This process enabled what was learned from the in-practice empirical input to be reflected in the final presentation of indicators and assists in supporting this as a tool for future research. Using the revised set with support from EU policy analysis enables the research to address **Research Question 5** *Can the insight gleaned from the local level provide important implications for EU level policy development?*, as it connects the use of policy, as well as the theoretical preliminary work, to on-the-ground practice. To begin the description of the “empirical + policy” part of this process, however, it is necessary to start with how policy documents within the EU context were selected before leading to the explanation of the analysis process, the outcome, and the connection

between the policy, theory, and practice.

In understanding the purpose behind the policy analysis component of the research, reiteration of methodological connections is here revisited and explained. As stated by Yanow (2007), "[i]n policy analysis, a hermeneutic approach leads to a focus on policy-relevant texts, such as legislative records, agency correspondence, annual reports, minutes from community board meetings, and so on" (Yanow 2007, p 114) and also extends to textual analysis of observational notes and interviews. The kinds of texts analyzed in the interpretive policy analysis within this research include communications, legislative records, white papers, and directives as well as the transcripts of the interviews provided from key informants. The final transcript analysis and results are elaborated in the later chapters (especially Chapters 9-10). In the case of both the interviews and the policy documents, analysis looked toward investigating and establishing shared meaning across documents to build understanding and enable the combination of experience-based understanding with outcomes of policy formation processes (i.e. the policy texts). This combination echoes concerns made by Fischer (2007), in that evaluating policy (specifically policy argumentation), it is important to " . . . always look in two directions, one micro, the other macro" (Fischer 2007, p 232); the macro in the case of this research being the EU level policy, and the micro being local level perception of practice. The next section explains the selection process for documents providing this "macro" level.

7.2 Selection of EU policy documents

After the completed collection of empirical data, an analysis of a broader pool of both formal and informal EU policy documents as well as the preliminary analysis of the first five interviews was used to finalize the category and respective indicator definitions used for the final analysis of all interview transcripts. Interview inputs revealed new potential indicators enabling an open-coding approach in the finalization process and encouraging use of the constant comparative method borrowed from the grounded theory methodological underpinnings of the research approach. The documents reviewed within this part of the analysis are comprised of both general policy (e.g. White Papers, Strategies, and Communications) and legally binding documents (e.g. EU Directives and Council Decisions) at the EU level. Document analysis at the international level is limited to the Hyogo Framework for Action. The documents analyzed are limited to the items listed in Box 7.2. In reviewing these documents, a "snowball" effect took place to attempt to reach a saturation of the most relevant documents. This was conducted through further analyzing documents (e.g. other Communications, Draft Conclusions) referenced within analyzed documents. In this way, one document would lead to another document, until the researcher had the impression that the references had come full circle (all documents referenced were reviewed

and referred to documents that had also been reviewed).

The documents are chosen based on their relevance to the topic in terms of general disaster risk reduction and the development of risk governance within the EU level context. In the analysis process of these documents, aside from a general open category, they were grouped into several categories depending on their specific relevance to the risk governance topic and attention to water-related extremes: climate change adaptation, EU and disaster risk reduction policy, Directives for water policy and disasters, the EU Civil Protection Mechanism, and in one exceptional case, UN level documents.

Of important note to the reader is that this analysis took place in the beginning of the year 2013, prior to the completion of the Sendai Framework for Action, which is why this document is not included within the above list. However, the potential for an update and enhanced reflection of the outcome of the policy analysis against the background of the Sendai Framework could prove fruitful as a continued avenue for further research. Documents pertaining to primarily Cohesion Policy and the Territorial Agenda were not included as they were considered of less direct relevance to the topic at hand but could equally provide an avenue for further research and expansion of the completed policy analysis in the future.

- Hyogo Framework for Action* (UNISDR 2005)
- Treaty of Lisbon Article 196 (Official Journal of the European Union 2007c)
- Council Decision of 5 March 2007 establishing a Civil Protection Financial Instrument (Official Journal of the European Union 2007a)
- Council Decision of 8 November 2007 establishing a Community Civil Protection Mechanism (Official Journal of the European Union 2007b)
- White Paper Towards a Harmonized EU Civil Protection (EOS 2009)
- Report from the Commission to the European Parliament and the Council on the evaluation of the application of the Civil Protection Mechanism and the Civil Protection Financial Instrument for the years 2007-2009 (EC 2011c)
- Proposal for a Decision of the European Parliament and of the Council on a Union Civil Protection Mechanism* (EC 2011b)
- Directive 2007/60/EC of the European Parliament and of the Council of 23 October 2007 on the assessment and management of flood risks* (Official Journal of the European Communities 2007)
- Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for Community action in the field of water policy * (Official Journal of the European Communities 2000)
- Council Directive 82/501/EEC on the major-accident hazards of certain industrial activities (Seveso Directive and 1988 amendments) (CEC 1982)
- Common Implementation Strategy for the Water Framework Directive (2000/60/EC) and the Floods Directive (2007/60/EC) (EC 2013)
- Communication from the Commission to the Council and the European Parliament: EU Strategy for Supporting Disaster Risk Reduction in Developing Countries* (CEC 2009)
- Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions: A Community approach on the prevention of natural and man-made disasters* (CEC 2009b)
- Communication from the Commission to the European Parliament and the Council on Reinforcing the Union's Disaster Response Capacity* (CEC 2008)
- Draft Conclusions on a Community Framework on disaster prevention within the EU (Council of the European Union 2009)
- Communication from the Commission to the European Parliament and the Council: Towards a stronger European disaster response: the role of civil protection and humanitarian assistance (CEC 2008b)
- White Paper: Adapting to climate change: Towards a European framework for action* (CEC 2009c)
- Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions: A Budget for Europe 2020 (EC 2011)
- White Paper on European Governance* (CEC 2009c)
- Green Paper on the insurance of natural and man-made disasters* (EC 2013b)
- The Stockholm Programme – an Open and Secure Europe Serving and Protecting Citizens (Official Journal of the European Union 2010)
- Communication from the Commission to the European Parliament and the Council: The EU Internal Security Strategy in Action: Five steps towards a more secure Europe (EC 2010)

*Indicates the initial documents selected and enabling the “snowball” effect

Figure 7.2: List of policy documents analyzed (with citation reference)

A brief explanation of the selection of some of the key documents (the documents that primarily led the “snowballing” effect) is provided here in the following bullet point list, with a focus on the communicating both the binding or non-binding nature of the document and the purpose for which the document was selected:

- The Hyogo Framework for Action 2005-2015: Building the Resilience of Nations and Communities to Disaster (HFA) (**Global level, non-binding**) *Purpose: primary document in terms of global level input for EU disaster-related policy. Although this document is at the global level, it was created by the members of the United Nations, to which all case study countries are members. The document’s predecessor, The Yokohama Strategy, is not selected for focus within the research as the research attempts to place greater focus on EU level rather than a global level focus.* (UNISDR 2005)
- EU Communication: EU Strategy for Supporting Disaster Risk Reduction in Developing Countries {SEC (2009) 220} (**non-binding, soft-legislation**) *Purpose: provides some evidence of how the EU views the topic of disaster risk reduction (DRR) in a broad sense. It gives, again generally, a status for the topic of DRR in the EU. The document stresses important points such as: that this topic should be more connected to development, that there is a lack of a “common voice” for DRR in the EU, and that there is a need for a better link to be established between adaptation and DRR. It also explicitly states that the Strategy includes flash floods and landslides and states that different hazards require different approaches. The document, furthermore, explicitly connects effective DRR with good governance.* (CEC 2009))
- EU Communication: A Community approach on the prevention of natural and man-made disasters {SEC (2009)203} (**non-binding, soft-legislation**) *Purpose: important in that this document stresses and sets the stage for the current status that there is no Community approach for disaster prevention. The Communication emphasizes linking actors and creating a knowledge base for policy at all government levels, including best practices and guidelines for hazard and risk mapping. It also targets awareness building and training as well as reinforcing and improving current instruments. Furthermore, the document stresses and concludes that the approach will be promoted through consultation with both public and private stakeholders.* (CEC 2009b)
- EU Communication: Reinforcing the Union’s Disaster Response Capacity (COM (2008) 130 final) (**non-binding, soft-legislation**) *Purpose: provides one of the first direct policy proposals toward a unified, EU disaster management policy. States that the EU is expected to protect citizens. Other important issues addressed include: solidarity in disaster prevention, mitigation, and response efforts. It also provides*

some of the responsibilities of the European Commission within this field. This document also explicitly states the need for greater coherence, effectiveness and visibility, reflecting some of the good governance principles mentioned in the White Paper on European Governance. The document also provides an example of the proposed actions for prevention, preparedness, response and recovery at least for fire hazard at the EU level. (CEC 2008)

- Proposal for a Decision of the European Parliament and of the Council on a Union Civil Protection Mechanism (COM(2011) 934 final) (**non-binding, good for policy development reference and would be legally binding if decision agreed upon and finalized**) *Purpose: included especially for relevance in EU level efforts to encourage prevention and preparation in a unified civil protection framework. The document explicitly highlights prevention and culture of prevention as one of the main objectives of the Mechanism. The document provides also a list of the problems identified from an impact assessment carried out via stakeholder consultations (impact assessment also included). (EC 2011b)*
- Directive 2000/60/EC establishing a framework for the Community action in the field of water policy (EU Water Framework Directive) (**legally binding legislative instrument, though flexible implementation**) *Purpose: helpful document in terms of connection of EU basin management approach as the general strategy for water management. It is also important to consider as it is the predecessor of the EU Flood Risk Directive. It includes also verbiage related to the use of good governance principles in management strategies (coherence and cooperation explicitly) and also makes reference and connection to spatial development. Though much more water quality focused, this directive is still very helpful in terms of reference to overall water management practices. (Official Journal of the European Communities 2000)*
- DIRECTIVE 2007/60/EC on the assessment and management of flood risks (Flood Risk Directive) (**legally binding legislative instrument, though flexible implementation**) *Purpose: is the most applicable directive to the actions that must be taken by Member States in terms of flood management and assessment. A directive for landslides, however, does not yet exist. (Official Journal of the European Communities 2007)*
- White Paper on European Governance (**non-binding, good for policy development reference**) *Purpose: this document is ideal for its reference to the “good” governance principles as part of the foundation of European Community governance. This “good” is taken therefore in the EU context according to this document, though elaboration is needed and is pursued through the research approach due to the vagueness of interpretation of terminology. (CEC 2001)*

- White Paper: Adapting to Climate Change: Towards a European framework for action (COM (2005) 147 Final) (**non-binding, good for policy development reference**) *Purpose: the document is helpful in terms of understanding the basics of the EU policy direction on climate change adaptation. As the research is not strictly limited to the DRR discourse, it is helpful to have this document especially as it highlights the topical importance of climate change, diversity of regional impact, and the need for a multi-level approach. Though an important component of the document, no intention was made to elaborate on the Clearing House Mechanism.* (CEC 2009c)
- Green Paper on the insurance of natural and man-made disasters (COM (2013) 213 Final) (**non-binding, good for policy development reference**) *Purpose: highlights importance and role of insurance within DRR in the EU. The document also stresses the connection between insurance and developing a “general culture of disaster risk prevention and mitigation”. This is, therefore, also helpful in addressing recent policy direction in terms of prevention and mitigation efforts as well as the continued reiteration and importance stressed in EU policy for building a culture of working toward DRR.* (EC 2013b)

7.3 Policy analysis process

After the selection of the policy documents, the policy analysis process was conducted using the initial set of categories. These were used to code the policy documents in MAXQDA software. Based on the analysis of the coded segments, the initial set was then revised. An image of the analysis process using the coding software is provided in Figure 7.3. Similar to the visual in Chapter 6 (for transcript coding), one can see from the image that the imported policy documents are in their respective groupings in the upper left-hand window, the analyzed policy document is found in the larger right-hand window, and the code system can be found in the window below the document groupings.

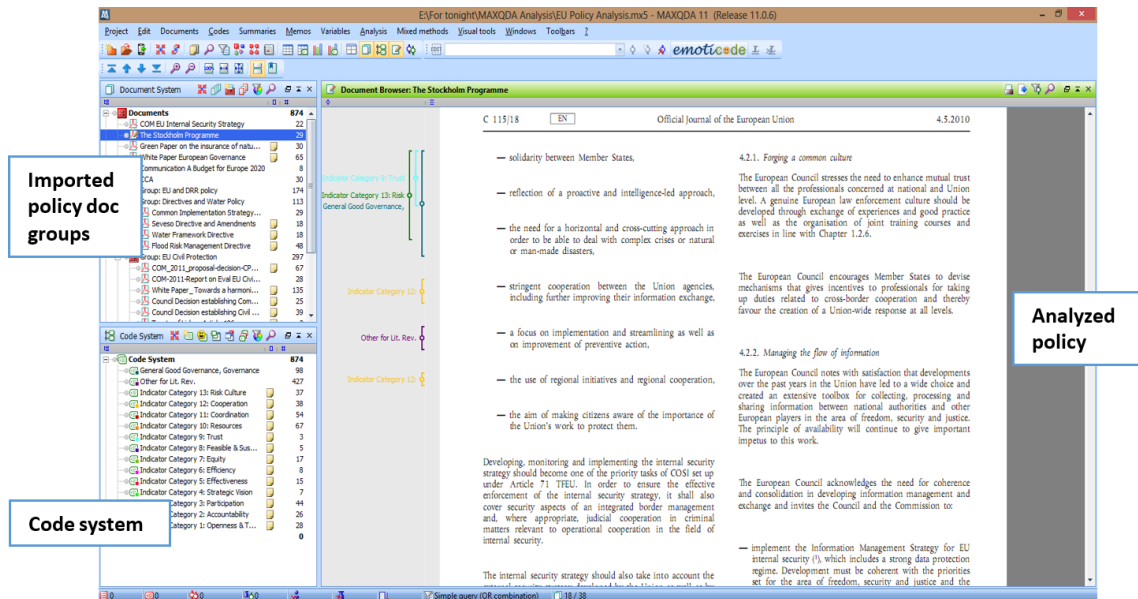


Figure 7.3: MAXQDA software screenshot of EU policy analysis process

A total of 22 policy documents were coded, creating 874 coded segments. Nearly all of the segments were analyzed. It is important to note that not all categories had the same number of coded segments. In fact, the number of relevant coded text segments were widespread, as follows:

- Openness & Transparency (28)
- Accountability (26)
- Participation (44)
- Strategic Vision (7)
- Effectiveness (15)
- Efficiency (8)
- Equity (17)
- Trust (3)
- Resources (67)
- Coordination (54)
- Cooperation (38)
- Risk Culture (37)

The reasons for this include the fact that some categories (such as **trust**) are not often, or are rarely mentioned in the policy documents. The concept of trust itself was not well defined within the policy documents, potentially a result of the difficulty in expressing such a normative concept within high level policy verbiage. It is also not surprising that **coordination** and **cooperation** as well as **resources** have more relevant policy text, as the nature of these documents is often the provision of guidance for carrying out management practices and especially how to manage resources on a very broad scale, across many different member states. Often, the terms **effectiveness** and **efficiency** were used interchangeably, as were **coordination** and **cooperation**. **Accountability**, **participation**, and **openness & transparency** appeared to have relatively high numbers of coded segments, inferring a higher degree of importance and relevance at the EU level as compared

to some of the other categories. **Risk culture**, had a curiously high number of applicable text segments. The overall amount of applicable text hints at the importance of this topic and its reiteration, which can be considered especially interesting given that (similar to **trust**) this is a highly normative concept. However, the research found that even given the number of segments there was not a clear definition of how this is interpreted at the EU level.

An example of the analysis of the coded policy segments is provided in Figure 7.4. This enables the reader to have a brief visual of the analysis provided for the sources and connection to EU policy for the **accountability** category. Here one can see the policy documents, the coded segments and reference points, and the analysis statements created by the researcher for each segment. A very similar process as was conducted for the transcript analysis. The provision of the direct reference point supports greater transparency in the overall research process, especially in terms of replicability of the analysis. Potential overlaps in the different categories and their analyses were highlighted in green, as can be seen in Figure 7.4. These overlaps were then reviewed and a determination was made in terms of how these overlaps influenced the final analysis.

Sources & connections to EU policy:

Document	Segment	Coded segment & ref pt.	Analysis
White Paper_ Towards a harmonized EU civil protection	Increase the coherence on r procedures across EU countr the resilience of Emergency whole Protection chain. <i>(Under "Recommendation 4 – Develop a common EU Risk Assessment methodology for increased interoperability of Civil Protection operational techniques, procedures and systems", p.14)</i>		Need for clear coherent risk management procedures. (in referring to emergency services across the EU)
White Paper European Governance	Already within the existing Treaties the Union must start adapting its institutions and establishing more coherence in its policies so that it is easier to see what it does and what it stands for <i>(Within "Executive Summary", p.3)</i>		Policies must also be coherent in order to understand what authorities do and what they promote. (referring to EU institutions and policies)
White Paper European Governance	The White Paper proposes opening up the policy-making process to get more people and organisations involved in shaping and delivering EU policy. It promotes greater openness, accountability and responsibility for all those involved. <i>(Within "Executive Summary", p.3)</i>		Accountability is connected to the openness of development and implementation of policy (highlights connection to category 1 Openness & Transparency)
White Paper European Governance	Accountability. Roles in the legislative and executive processes need to be clearer. Each of the EU Institutions must explain and take responsibility for what it does in Europe. But there is also a need for greater clarity and responsibility from Member States and all those involved in developing and implementing EU policy at whatever level. <i>(Within "II. Principles of Good Governance", p.10)</i>		Legal responsibilities (as well as processes) must be clear. The differentiation of responsibilities at different levels must be clear.
White Paper European Governance	Coherence. Policies and action must be coherent and easily understood. The need for coherence in the Union is increasing: the range of tasks has grown; enlargement will increase diversity; challenges such as climate and demographic		Especially in the face of a complex system (such as that which is affected by multiple challenges, including climate change), both policies and

Figure 7.4: Screenshot from description book of connections to EU policy for accountability category.

This analysis, along with other parts of the policy analysis process, were originally put together and presented in an analysis book as a separate annex. However this “book” amounted to nearly 130 pages and, with the need to reference different parts for different chapters, was separated in its parts into multiple annexes. These parts include: Annex 13 EU policy analysis coded segment work; Annex 14 Relevant questions asked per category

(questions asked during the interviews); Annex 12 Fieldwork test and input into indicator development (i.e. the analysis of the first 5 transcripts used as a test); and Annex 11 Final category and indicator system tables (including definitions, indicators, and tables of evidence base in EU policy).

This policy analysis in combination with the first 5 transcripts analyzed were worked into a final policy and empirically-based indicator set for each category. Patterns were identified in the coded segments and key points from these patterns were derived to form indicators. For the sake of maintaining transparency in the research process, the supporting policy documents and the respective reference location was recorded for each individual indicator. This, again, was documented in detail to enhance the potential replicability of the policy analysis and outcome of interpretation. Tables were made to house this information for each of the categories. These tables, along with the sources and connections to EU policy tables, provide the bulk of the analysis book contents. A glimpse of what these indicator tables look like within the book structure is given in Figure 7.5 What is important about this process is that it shows how multiple policy documents support the creation of individual indicators, and provide evidence in its understanding within the EU context.

Indicator	Supporting Policy Document (reference location)
1. Risk management procedures, including their supporting policies and legal framework, are clear and coherent. <ol style="list-style-type: none"> Laws and policies for particular roles are clear and coherent. The legal system itself is perceived as clear and coherent. 	White Paper_ Towards a harmonized EU civil protection (Under "Recommendation 4 – Develop a common EU Risk Assessment methodology for increased interoperability of Civil Protection operational techniques, procedures and systems", p.14) (referring to emergency services across the EU) White Paper European Governance (Within "Summary", p.3) (referring to EU institutions and White Paper European Governance (Within "Good Governance", p.10)
2. The differentiation of responsibilities is clear. <ol style="list-style-type: none"> Responsibilities are clear between different levels (vert.) There are no overlaps in responsibilities at the same level (horiz.) 	The Stockholm Programme (Under, "1. Towards a Citizen's Europe in the Area of Freedom, Security and Justice", under "1.2 The tools", within "1.2.3 Legislation", p.6) White Paper European Governance (Within "II. Principles of Good Governance", p.10)
3. Authorities are held accountable for their respective roles and responsibilities <ol style="list-style-type: none"> Monitoring and reporting of procedures are put in place to ensure fulfilment of responsibilities Authorities themselves review, monitor, and report on particular tasks Incentives exist to ensure 	Seveso Directive and Amendments (Article 4, p.3) COM_2011_proposal-decision-CPMechanism_en (Under "2. Management Measures", within Box under "2.1 Monitoring and reporting rules", p.50) Flood Risk Management Directive (Under Chapter VIII "Reviews, Reports and Final Provisions", within Article 14, clauses 1-3, p.33) (referring to the preliminary flood risk assessment, flood hazard maps, flood risk maps, and flood risk management plans).

Figure 7.5: Screenshot from analysis book featuring indicators for accountability category

Along this process of coding and deriving indicators from the EU policy documents, a validation test was employed using the first five interview transcripts. The purpose of this was to "test" the coding process and to check for conflictual connections and overlaps prior to the analysis of all transcripts. It provided an initial empirical input from the primary fieldwork in support of the development of the revised category and indicator system. Annex 12 Fieldwork test and input into indicator development clarifies and provides the

output of this empirical test. This process was carried out in a similar fashion as the process of analyzing each of the policy documents. This included the same type of tables and was comprised of the transcript reference (in lieu of the policy document name), the coded segment text from the transcript, and the analysis statement for each segment created by the researcher. The documentation of this test adds further transparency in the interpretation of inputs for revising and creating the tool used in the final analysis of all interview transcripts. The results of this test indicated several similarities with respect to patterns derived from the policy document analysis. These are highlighted in the next Section 7.4 through the indicators that are listed in “blue” text in Table 7.1.

7.4 Revised category and indicator system

The revised category and indicator system is presented in Table 7.1. For each of the 12 categories, a definition and list of indicators is provided. The (revised) category definition is derived from the listed indicators and considers each indicator, attempting to make a statement that reflects the full scale of the content of the indicators and formulating this content into a single definition statement. The lists of indicators themselves are derived through the EU policy analysis and the analysis of the first five interview transcripts. They were created in the form of statements that can be addressed with a yes or no. The statements themselves reflect a “desired” state of current practice and are structured in this way to enable the use of a traffic light system as a means of measurement for the final analysis. An attempt was also made to limit the total number of indicators to five indicators per category. The reason for this was to avoid an unequal balance of indicators amongst the different categories, and to try to simplify the tool overall.¹ The table housing the revised system also makes mention of where the indicators are connected to the IRGC risk governance deficits.² This is highlighted in blue text similar to the indicators derived from the empirical test from the first five interview transcripts. In connecting back to the previous section, the development of new indicators based on this empirical input indicates the possibility of deriving indicators outside of policy, and solely from “practical” inputs. This reflects the potential to develop or refine the existing revised system after the completion of the full transcript analysis.

It is important to communicate that what is presented in this section is the result of the work up to but not including the coding of all interview transcripts. This includes support

¹ All categories feature five indicators with the exception of the category **trust**. This is due to the limited information provided within the policy documents and empirical test results.

² The purpose of mentioning this connection is to explicitly make plain where previous influence from the literature used in the initial set of categories and indicators has permeated through the process to the revised system. It also provides direct connection to some of the current scientific departures created from the work of the IRGC.

from: the EU policy analysis, the first five interview transcripts (empirical validation test), and the category code test (validation and replicability test) mentioned previously in Chapter 6. This analysis supported the elimination of one of the original 13 categories in the initial category list. Throughout the development process for the revised system, it became obvious that the category originally labeled as **feasible & sustainable** should be removed from this list. This category was reallocated and integrated within the other existing categories due to the dramatic overlap and lack of enough, stand-alone evidence to merit its own category. The original definition for this category was: continuation of strategies is enabled within given resources and interests and without disadvantaging future generations. The main points that began to form the indicators included:

- *intergenerational equity* (i.e. not disadvantaging future generations), which was absorbed into **equity**
- *strategy continuation into the long-term*, which was found to be contained within **strategic vision**
- *adequate & feasible physical capabilities*, which was directly related and found to already be within **resources**

With regard to the other 12 categories, a few observations about their development and revised formulations can be made as follows:

Openness & transparency: This category targets accessibility and availability of risk information and about the process of practices themselves. Availability refers to whether or not information exists (is available), while accessibility refers to the ability one has to be able to see and possess this information (see Indicator 1). The transparency part of this category is also emphasized in terms of the coherency of the information, meaning how well this information can be understood by a variety of publics (Indicator 2). The different groups this refers to include not only all persons who assess, manage, and communicate risk-related information, but also those who are affected by risks. This also reflects the content of Indicator 3, with respect to the dissemination (or very roughly “distribution”) of risk information to these different audiences. The audiences explicitly mentioned within this indicator reflect those that were directly mentioned within the analyzed policy documents. Indicator 4 focuses specifically on the public as a target group, ensuring that the public, as an oft stressed key target group in openness and transparency related policy statements, receives enough information. This along with Indicator 5, which stresses the need for multiple sources of information, can be seen as connected also to the category **resources**. However, the fact that the focus is specifically on the public and the availability and accessibility of this information, is key to the general concepts of what is meant with “open” and “transparent” processes. This last Indicator 5, was derived solely from

the empirical test of the first five interviews. Stressed by several of these key formants, this was seen to also be more closely connected to enhancing openness and transparency of processes and general risk related information.

Accountability: focuses on the clarity of roles and responsibilities, as well as whether there are mechanisms to hold actors accountable in fulfilling their tasks. The first indicator refers explicitly to the coherency of the regulatory framework, while Indicator 2 addresses whether there are problematic overlaps in the differentiation of responsibilities. The first considers how well regulations are understood, while the second addresses potential in-practice issues with respect to the fulfilment of responsibilities stipulated within this framework. Indicators 3 and 4 emphasize the presence of reviews, monitoring, and reporting used to hold actors accountable to their responsibilities (Indicator 3) and to consider the implementation and maintenance of the measures and actions put in place (Indicator 4). Indicator 3 also mentions the relevance particularly of public actors as these actors are often the primary actors responsible for the implementation of risk governance processes (e.g. assessment, management, and communication of risks) and practices (e.g. the actions and measures implemented within these processes). The last indicator was derived as a more specific focus on maintenance of structural measures as this was seen to be a recurring issue from the empirical test. This was also assumed to merit its own indicator statement based on the observations from the initial site visits and the impression from the researcher that the maintenance of structural mitigation measures (or lack thereof) was a recurring theme within all cases.

Participation: the focus of this category is on the involvement of stakeholders (all those who have an interest or are affected by disaster risks), especially the local community. Particular attention is paid to emphasizing higher forms of participation such as the integration of local knowledge into implementation of projects and events. Indicator 1 draws attention to community involvement and focuses on encouragement in participating in consultation activities for both prevention and response. Indicator 2 considers the level of involvement, particularly highlighting a need for two-way communication and bottom-up pathways. Indicator 3 focuses on the need for raising awareness and educating the general population and is included as a key part of encouraging an educated population that can contribute to different risk governance processes. The focus of Indicator 4 is primarily the need for including practical experience as an important part of integrating local knowledge into decision-making processes. Feedback systems are also a key part of this category featured within Indicator 5 and refer to the potential for an iterative approach to policy development and implementation.

Strategic vision: this category emphasizes a future-oriented focus, with attention to both short and long term temporal scales. The first indicator explores whether the vision as understood by the key informants includes cross sector integration of DRM policy, planning, and programming. It also addresses key aspects of strategic vision that appear repeatedly within the EU policy documents, including strengthening local capacities and targeting vulnerability reduction. Indicator 2 focuses on sustainability, explicitly emphasizing the need for strategies to follow according to the sustainable development principle. The third indicator draws attention to the need for both short and long term foci in the timeline strategies follow and includes the importance of whether this is positively perceived by authorities and the public. The fourth indicator is derived from risk governance deficits originating from the work of the IRGC. This indicator focuses on the need for similar prioritization of strategies or overall activities amongst the various actors carrying out risk governance processes. The last indicator takes this a step toward policy formulation with attention directed toward common goal orientation and a structure enabling a realization of a common vision amongst actors.

Effectiveness: the category labeled **effectiveness** focuses on the flexibility and efforts needed for achieving strategy objectives and goals. Emphasis is placed on output and fulfilling purpose. Indicator 1 addresses this in terms of the learning from past experiences that helps enhance effectiveness in achieving overall goals, while Indicator 2 focuses on whether early warning systems fulfill their purpose in practice with regard to alerting and mobilizing appropriate actors for disaster response. Indicator 3, though similar to the first two indicators, focuses on general preparedness, but applies this to a wider range including authorities, individuals, as well as communities. The list of these three is for the purpose of identifying the importance of not only responsible authorities (such as state actors), but also the local level in terms of the community (as a group actor) and the individual (individual behavior might not reflect the behavior of the general community). The fourth indicator emphasizes flexibility and redundancy, seen as aspects bolstering resilience of practices and enhancing abilities to reach strategy goals in response to a changing environment. The last indicator is a product of both the work of the IRGC and the empirical test input. It focuses on whether or not regulatory frameworks are upheld in practice and provides an emphasis on maintaining the rule of law. This indicator is also the reason why there is not a separate category for “rule of law”, as it is encompassed within **effectiveness** and is understood within the implementation (or not) of these frameworks.

Efficiency: the focus of this category is optimization of resources and the efforts to use these resources. The first indicator reflects the subsidiarity principle within this context and encourages that efforts be made at the most appropriate level. The second indicator draws attention to the sustainable use of resources and features pooling of resources as a

means of working toward optimization of their use. This indicator also connects directly to the **strategic vision** category with respect to its emphasis on long term considerations. However, it diverges in its focus explicitly on optimization of resources within a longer temporal scale. Indicator 3 is relatively straight forward and addresses the key issue of avoiding duplication of work and excessive costs. This can also be related to the first indicator in that use of resources at the most appropriate level can reduce efforts recurring at multiple levels of governance. However, this indicator focuses more specifically on the issue of duplication, and not necessarily on the most appropriate level in which efforts should be made. Indicator 4 pays attention to the need to pursue (if not already use) best practices and technologies. The last indicator was created from both the policy analysis and the empirical test. This targets the timeframe in which strategies and the specific actions supporting these strategies are carried out. This notion of “adequate” here refers to whether this enables exchange of information amongst the multiple governance levels as well as the ability to give attention to preventative actions prior to disaster. Though **strategic vision** refers to both short and long term foci, the last indicator for **efficiency** differs in that it specifically addresses that a timeframe (regardless of short or long term focus) permits adequate communicative exchange and enables prevention to be a part of these efforts.

Equity: the category of **equity** focuses on reducing disadvantages to a variety of groups, encouraging solidarity, and eliminating discriminatory practices. Indicator 1 promotes intergenerational equity by drawing attention to the need for preventing disadvantage to future generations. Indicator 2 addresses groups who are isolated and those who have special needs given their spatial environment. This highlights the importance of “place” and of paying attention to difficult geographies (e.g. areas that face extreme physical conditions, especially in the instance of extreme events) and the consequences of living in this environment. The third indicator focuses on vulnerable groups such as children, elderly, poor, disabled, populations living in informal settlements as well as displaced populations. The third indicator addresses **equity** within the context of educational and training efforts employed in risk governance processes. This indicator focuses on impartiality, gender neutrality, and cultural sensitivity in the development and implementation of these efforts. Attention within this indicator is furthermore paid to addressing social groups who are not part of established knowledge networks. The last indicator directs attention to the solidarity principle. The principle is understood within this indicator to mean that strategies encourage policy and actions that demonstrate mutual support and unity in working toward a common interest or goal both within and outside the affected communities. This refers, for example, to one community supporting another community that has been affected by an event. This can also be seen in cross-border support provided in the case of extreme events (e.g. the 2003 flash flooding and debris flow event in the Fella catchment in FVG, Italy). The indicator also draws attention to prevention and using preventive ac-

tions to reduce disparities. Within this same vein, the indicator also emphasizes creating equitable distribution in the share of burdens borne and potential impacts.

Trust: this category proved to have the least amount of material to work with from the policy analysis output. This was in large part, as aforementioned, due to the lack of the use and explanation of this term within the policy documents. Nevertheless, four indicators were derived with a focus on the perceived confidence and integrity one group (such as the public or state authorities) has toward another group. The first indicator addresses the confidence the public has in the local authorities and particularly on the perception of the integrity of these authorities in fulfilling their duties. Indicator 2 reflects this same understanding but between the public and higher level authorities. It was important to differentiate between the public's level of trust between both local and higher levels due to the fact that this is often (in practice) not the same. Indicators 3 and 4 focus on this understanding between different authorities. Indicator 3 focuses on the confidence and perception of integrity between authorities within the same horizontal levels of risk governance processes, while indicator 4 focuses on this perception between authorities in different vertical levels. One critique can be made that there is not a vice versa focus of how the authorities feel they trust (or do not trust) the public. This is a consideration that, in retrospect, can relate to the concept of civic responsibility, an important topic at least within the Romanian case study site of the Nehoiu catchment.

Resources: the category of **resources** proved to have a substantial evidence base from which to derive a series of indicators. The first indicator specifically addresses the kinds of resources that should be adequately available and highlights the following: knowledge relating to risk, hazard, and vulnerability; transportation resources; emergency communication resources; personnel; equipment; finances and time to complete tasks. The key differentiation here between this indicator and those found within the category of **openness & transparency** is the focus on "adequate" availability in the form of physical presence and amount needed to fulfil tasks for the assessment, management, and communication of risks. The "time" component of this indicator also draws connection to **efficiency**, however it differs in that the efficiency category focuses on a timeline pursued which enables communication and exchange of information, while **resources** focuses on having enough time to complete pursued tasks. The second indicator focuses on compatibility, exchange, and interoperation of equipment and material resources. On a related note, Indicator 3 addresses the need for an inventory or platform for exchanging information amongst actors about best practices and past events, particularly for lessons learned and best practice examples. Indicator 4 directly states that resources should be affordable and especially highlights the need for affordable sources of information. The last indicator addresses the

need for backup resources such as pre-committed assets and emergency funds.

Coordination: is differentiated from cooperation in that it focusses on legally required actions. This is not the universally accepted way in which to differentiate the two terms. However, it was necessary to distinguish between what is considered legally required action and what action is carried out outside of any legal mandate. As aforementioned, the policy documents also do not maintain any universal definition and tend to use the two terms interchangeably. The first indicator targets the perception of how well entities work together in managing equipment, training, emergency care and support, outside assistance, procedures, and planning. This list of items was chosen as these were identified as repeated and key coordinated efforts within the various policy documents analyzed. Indicator 2 stresses the need for bottom-up focus in coordination efforts, fueled by the needs of the local level. The third indicator focuses on a communicative link that should be established between different stakeholders. This emphasizes the need to link emergency management and planning authorities as well as linking different decision-makers, civil protection and environmental services, and also encourages exchange of best practices within this communication. Indicator 4 refers to the perception of coordination (and how well this works) between authorities in the same horizontal level, and between authorities across different vertical levels. The indicator also addresses the importance of positively perceived coordinated activities across different sectors. The fifth and last indicator focuses on a harmonization of efforts, stressing the need for a holistic approach using common measures, response language, standards, and protocols. This may be seen as similar to the **resources** category with respect to the second indicator dealing with compatibility and interoperation. The difference with Indicator 5 for **coordination** is that the focus is placed not on the interoperation or exchange of the resources themselves but on the use of these resources according to required actions in a holistic way.

Cooperation: in contrast to **coordination**, the category of **cooperation** focuses on actions and efforts that are not prescribed by any legal framework. The first indicator refers to the perception of how informal tasks and interactions are carried out within common horizontal and across different vertical levels. The focus of Indicator 2 makes specific reference to this perception but with explicit connection to the local level and especially with interactions involving the public. Indicator 3 targets the presence of informal connections existing between practitioners, policy-makers, and scientific researchers emphasizing a need for connecting these networks of different actors. Attention is particularly paid to the need for informal interactions between emergency management actors and planners. The fourth indicator focuses on informal exchanges of information and draws attention to exchanges between different vertical levels, especially for sharing best practices. The last indicator was a product of the empirical test and refers to informal tasks that target efforts

for research, training, education, and volunteer activities.

Risk culture: the last category, labeled **risk culture**, proved to be the most difficult to ascertain. The policy documents discuss a variety of phrases such as building a “culture of risk”, a “risk culture”, a “culture of prevention”, and a “culture of safety”. Due to the fluidity and ambiguity of the understanding behind this terminology, this particular category was considered to be the most exploratory of the final 12 and was indeed developed in its revised form at a slower pace than the others. This, similar to trust, tended to be a much more normatively interpreted concept than other more straight forward categories. However, there did appear over time to be a confluence of similar ideas in understanding the meaning behind “culture and risk” within a risk governance context. This included primarily a focus toward safer communities, risk awareness, prevention, local level empowerment, and consideration for the needs and priorities of the local level. Self-initiated actions, such as acquiring insurance, is also an important focus. The five indicators developed for this category reflect these foci and are explained in the following paragraphs.

Indicator 1 was created with the focus on the empowerment and encouragement of the local level (especially the general population) to be informed and to take self-initiated actions. Indicator 2 was a product of both the policy and the empirical analysis and addresses the existence of a well-informed population with a high level of awareness. Attention here is also drawn to the role of the media in these efforts. Although the media as an actor was unfortunately not pursued within this research, it is nevertheless important to include this actor within the understanding of **risk culture** here because of its (potentially great) influence on the level of awareness and its contribution to understanding this concept as a whole. Indicator 2 bears similarity to the content of the **participation** category with respect to **participation’s** Indicator 1 (targeting community involvement and encouraging participation) and Indicator 3 (focuses on raising awareness). Where the **risk culture** category differs is that it goes beyond involvement and reaches empowerment. It furthermore goes beyond attempting to raise awareness and moves toward achieving a high level of awareness within the current population. The third **risk culture** indicator was also influenced by the empirical test as well as the policy analysis and states that strategies encourage a focus on prevention and emphasize “pre-disaster activities”. This is in part related to the core of the **strategic vision** category. However, **strategic vision** places emphasis on the need for both short and long term foci, while the **risk culture** explicitly targets a prevention focus.

Indicator 4 draws attention to the need for strategies to pursue solutions that take into considerations characteristics, needs, and priorities of the local level. This indicator also highlights the importance of this consideration within high risk areas. It draws common

ground with the **equity** category with respect to the need for strategies to pay attention to vulnerable groups, and especially those who are located in isolated communities and difficult geographies. **Risk culture** differs in that it targets the consideration of needs and priorities, especially of at risk groups, into strategy solutions. A connection and potential overlap with the **coordination** category in terms of the need for bottom-up coordinative actions starting with the needs of the local up to the higher levels can also be seen with this indicator. However, similarly to the diversion from **equity**, **risk culture** is more concerned with whether solutions (not necessarily coordinative actions) actually consider needs and priorities of the local level.

The fifth and final indicator draws attention to livelihoods and the need to protect livelihoods in the efforts made to enhance local capacities. The indicator particularly targets efforts to provide information on individual actions that can be taken, especially community based local level activities – all within the context of protecting livelihoods. There is a connection to both **strategic vision** and **resources** with respect to the focus on building local capacity. **Strategic vision** focuses on the need to include strengthening local capacity as a part a key component of integrating DRR into plans, policies, and programs. **Resources**, within its core definition, addresses the need for adequate resources (such as equipment, personnel, etc.) to enable improved or at least sufficient capacity to carry out risk assessment and management practices. The **risk culture** indicator differs in understanding from both in that it focuses primarily on protecting livelihoods as a sources of enhancing local capacities.

Table 7.1: Revised category and indicator system for "good" risk governance

Category name	Definition	Indicators
(1) Openness & Transparency	Information related to risk-management practices, and the practices themselves should be available, accessible, and coherent for all those who assess, manage, and/or are affected by risks both in peace and in crisis time.	<ol style="list-style-type: none"> 1. Risk and hazard information is openly available and accessible. 2. This information is provided to the public in a clear, understandable language. 3. Risk information (including risk maps) is widely disseminated especially to the following audiences: the public, communities at risk, and decision-makers. 4. The public has enough information and does not have a feeling of incomplete information, especially in case of an event in which information is updated and repeated. 5. Multiple sources of information exist (e.g. a variety of communication methods are pursued) (from first 5 interviews).
(2) Accountability	Roles and responsibilities (and the distribution thereof) must be clear and a form of evaluation, reporting, monitoring, and or maintenance or actions, measures and systems should exist to ensure the fulfillment of these roles and responsibilities.	<ol style="list-style-type: none"> 1. Risk management procedures, including their supporting policies and legal framework, are clear and coherent. 2. The differentiation of responsibilities between and within different levels is clear and avoids problematic overlaps. 3. Actors (especially public authorities) are held accountable for their respective roles and responsibilities through monitoring and reporting as well as incentives. 4. Check-ups such as reviews, monitoring and maintenance exist in terms of implemented actions, measures and systems. (also supported from first 5 interviews). 5. Maintenance of structural mitigation measures is taken into account by relevant authorities (from first 5 interviews).

Table 7.1: (continued)

Category name	Definition	Indicators
(3) Participation	Stakeholders (including the local community) are involved through consultation or through higher forms of participation integrating local knowledge through means such as public projects and events as well as feedback systems in policy implementation.	<ol style="list-style-type: none"> 1. The community is involved and is encouraged to be involved in consultation activities featuring a wide range of stakeholders as well as a focus on both prevention and response. 2. Stakeholders (including the public) are “actively involved”, or at least are enabled to be “actively involved”, via two-way communication as well as both bottom-up and top-down pathways. 3. Efforts to raise awareness and educate the population through means such as public projects and events about DRR exist, especially those which pay attention to children and people in high risk areas. 4. Local knowledge including practical experience is used in decision-making and enables bottom-up input. 5. Feedback systems exist enabling the ability to receive input on policy implementation.
(4) Strategic Vision	Stakeholders work toward a future goal that is sustainable, considers both short and long term foci, and integrates DRM into policy planning and programming.	<ol style="list-style-type: none"> 1. Goals toward realizing this vision include integrating DRM into policy, planning and programming across sectors targeting vulnerability reduction and local capacity strengthening. 2. The vision and its policies concerning risk and vulnerability reduction are sustainable (follows according to the sustainable development principle), especially for flood risk management policies. 3. Strategies follow a particular timeline that includes short and long term foci that is positively perceived by both authorities and the public. 4. There exist the same or similar priorities within the overall strategy or activities of various actors. (from Risk Gov. Deficits not policy docs). 5. There is evidence of a structure based on goal orientation for realizing a future vision (from first 5 interviews).

Table 7.1: (continued)

Category name	Definition	Indicators
(5) Effectiveness	Disaster risk management frameworks consist of efforts which are flexible, and enable the ability to achieve strategy objectives and end-goals.	<ol style="list-style-type: none"> 1. Assistance provided (e.g. in past experiences) helps achieve overall or end goals. 2. Early warning systems fulfil their purpose by alerting appropriate bodies to disasters and threats. 3. Authorities, individuals and communities are well-prepared. 4. Flexibility and redundancy are demonstrated and enable a response to adapt to change while still ensuring capacities to meet goals (e.g. through updating policies in response to change). (also from Risk Gov. Deficits) 5. Regulatory frameworks are upheld and achieve their purpose in practice (from first 5 interviews) (also from Risk Gov. Deficits)
(6) Efficiency	Resources, including time, are not wasted but rather optimized through efforts made at the lowest, most appropriate level within an adequate timeframe and pursuing best practices and technologies.	<ol style="list-style-type: none"> 1. Actions are appropriate and are taken at the most appropriate level, reflecting the subsidiarity principle. 2. Resources are used wisely and sustainably through means such as pooling to ensure optimized and continued use in the long-term. 3. Duplication of work and excessive costs are avoided. 4. Best practices and best technologies are pursued. 5. Efforts are carried out within an adequate timeframe, enabling both information exchange between multiple levels for authorities and first responders, as well as attention given to preventative actions prior to disaster (both from policy and interview transcripts).

Table 7.1: (continued)

Category name	Definition	Indicators
(7) Equity	Strategies do not disadvantage particular groups, but rather encourage intergenerational equity and solidarity through non-discriminatory strategies, especially those assisting vulnerable groups and areas.	<ol style="list-style-type: none"> 1. Adaptation does not disadvantage future generations, reflecting promotion of intergenerational equity. 2. Attention is paid especially to those places that are isolated and or have special needs as a consequence of their difficult geography. 3. Strategies pay attention to particularly vulnerable groups (e.g. children, elderly, poor, disabled, populations living in informal and marginal settlements, directly affected and displaced populations). 4. Efforts and measures employed (e.g. for training and education) are impartial, neutral and non-discriminatory as well as gender and culture sensitive, including for vulnerable groups and to those who are not part of established knowledge networks. 5. The solidarity principle is encouraged within and outside the affected community through strengthening DRR in especially high risk areas (e.g. using prevention to reduce disparities in protection, and ensuring equitable distribution of burdens and impact).
(8) Feasible & Sustainable	CATEGORY REALLOCATED due to dramatic overlap and lack of enough, stand-alone evidence to merit its own category.	
(9) Trust	Interactions between and among public and non-public actors occur based on an assurance (and belief) of mutual reliability, including confidence in capacities of authorities, honesty and integrity.	<ol style="list-style-type: none"> 1. The public has confidence in the competencies of the local authorities and trusts in the integrity of their activities. 2. The public has confidence in the competencies of the higher level (non-local) authorities and trusts in the integrity of their activities. 3. Authorities within the same horizontal levels feel they can rely on one another and have confidence in each other's abilities. 4. Authorities within different vertical levels feel they can rely on one another and have confidence in each other's abilities.

Table 7.1: (continued)

Category name	Definition	Indicators
(10) Resources	Resources are adequately available and exchanged and enable sufficient and or improved capacity for risk management practices, including both physical (e.g. money, personnel, and equipment) and non-physical (e.g. time, knowledge and resources).	<ol style="list-style-type: none"> 1. There are adequately available resources including: hazard, risk, vulnerability knowledge; transportation resources; emergency communication resources; personnel; equipment, finances and time to enable capacity to fulfil tasks for the local level and above. 2. Resources such as equipment, materials, and information are compatible, interoperable and exchanged. 3. An inventory or platform for information exists including information about past events, data sources, best practices and lessons learned in order to assist in the exchange of information between stakeholders. 4. Resources such as information are affordable. 5. Pre-arranged and backup resources exist including emergency funds and pre-committed assets.
(11) Coordination	Formal (legally required) tasks and interactions between multiple stakeholders (including the public) within different sectors and levels run smoothly and are positively perceived.	<ol style="list-style-type: none"> 1. Coordination is perceived as effective for managing equipment, training, procedures, planning, emergency care and support outside assistance. 2. Coordination occurs among stakeholders at all levels through a bottom-up approach starting with the needs of the local up to the higher levels. 3. A communicative link established between different stakeholders for transferring of information, linking emergency and planning authorities, linking different decision-makers, linking civil protection and environmental services, and allowing for exchange of best practices. 4. There is perceived to be a good level of coordination within horizontal and between different vertical levels as well as across sectors. 5. Coordinated efforts support a harmonized, holistic approach to DRR using common measures, response language, standards and protocols.

Table 7.1: (continued)

Category name	Definition	Indicators
(12) Cooperation	Informal (not legally required) tasks and interactions between multiple stakeholders (including the public) within different sectors and levels run smoothly and are positively perceived.	<ol style="list-style-type: none"> 1. The informal tasks and interactions are positively perceived within and between all levels. 2. Informal tasks and interactions are positively perceived within the local level and especially with interactions involving the public. 3. Informal interactions exist between those who are practitioners, policy makers, and scientific researchers as well as across sectors, especially between planners and emergency management authorities. 4. Non-formal structures exist in terms of exchange of information between vertical levels especially for exchange of best practices. 5. Informal tasks and interactions are perceived as positive for research, training, education, and volunteer activities. (also from interview transcripts)
(13) Risk Culture	Strategies work toward a “culture of safety” translating to outcomes including a high level of risk awareness, a focus on prevention, consideration of the needs and priorities of the local level, and encouragement and empowerment of local level self-initiated actions to enhance capacity for DRR.	<ol style="list-style-type: none"> 1. The local level and especially the general population is empowered and encouraged to be informed and take self-initiated actions (e.g. insurance). 2. The population is well-informed and has a high level of awareness (e.g. also through the role of the media). (also from interview transcripts) 3. Strategies employed encourage a focus on prevention and emphasis on “pre-disaster activities”. (also from interview transcripts) 4. Strategies pursue solutions that take into consideration the characteristics, needs, and priorities of the local level, and especially of high risk areas. 5. Efforts are taken to protect livelihoods through the provision of information on individual actions that can be taken, as well as community based, local level activities (e.g. training, drills, and volunteering) to enhance local capacities.

7.5 Connecting policy, theory & practice

After the presentations of the policy analysis process and the output of the revised category and indicator system, it seems fit to bring this chapter to a close with a brief discussion on the connection between the policy component of the research with theory and practice. This acts as a concluding section for the policy understanding, reflects on how this is connected to the original conceptual understanding, and permits a transition to the practical research component, the focus of the next several case study-related chapters (see Chapters 8 through 13).

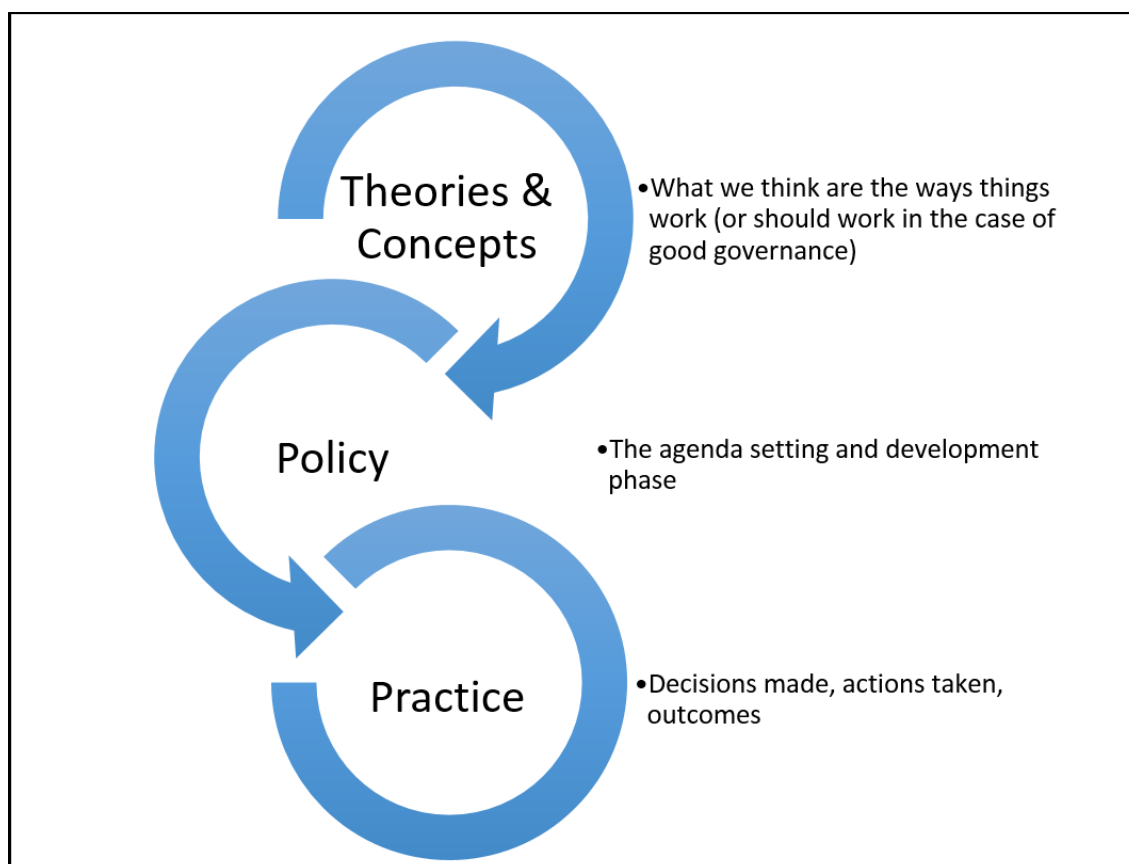


Figure 7.6: Simplified diagram: Connecting policy, theory, and practice.

A simplified diagram is provided in Figure 7.6. This highlights the three parts of this section: theory, policy, and practice. In communicating the **theory** part, one can understand that this forms the basis also of how one "should" pursue actions and make decisions according to the established understanding stemming from logic structures, norms, values, and beliefs influencing decision-making processes. With respect to **policy**, this refers to the agenda setting and development phase in which one takes underlying assumptions and generates from them a guidance (whether legally binding or informal) for practice. The

practice part represents the implementation part of this cycle. One learns from that which can better inform the underlying assumptions of how things work (or should work) and the "theory", which in turn better informs how we create guidance or "policy" for future practice.

Theories and concepts presented in Chapters 1 through 4 of this dissertation support the evidence base for the **theory** component, while the policy analysis and the development of the comparative tool using this analysis provides the evidence base for the **policy** component. There are feedback loops especially between the **policy** and the **practice** parts as highlighted in the conceptual framework diagram in Chapter 4. This demonstrates (and is reiterated here) that the development of policy shapes and is shaped by the in-practice decisions made, actions taken, and outcomes. This proves to be a key point in the use of a tool derived from a common level policy analysis to further analyze, learn from, and integrate practical input provided from the primary fieldwork in each case study site. In using this tool to get from the final analysis of the primary fieldwork data to the presentation of results in each case, transcripts were coded according to the categories and understanding of the respective category indicators. This was an iterative process that permitted reflection of the EU level policy and recommendations for further revision of the system itself. Additionally, in the multi-case analysis, the comparative tool also enables enhancing an understanding across in-practice contexts with respect to the phenomenon under investigation.

Chapter 8

Case study spatial boundaries and contexts

This chapter provides an important input into understanding the spatial delineation of the case study site boundaries for both the main and the satellite cases. This is necessary before delving into and understanding the results presented in Chapter 10 (Nehoiu catchment main case), Chapter 11 (Barcelonnette catchment main case), and Chapter 12 (the comparative case) as well as the introduction to the results presented in Chapter 9. The chapter assists in addressing **Objective 2** *Establishment of what is the spatial context in which risk governance processes occur within each case study area through both desk study research and fieldwork* by providing background information for the physical and social contexts of the presented cases. This background also helps support **RQ2** *Do the key actors and the distribution of their roles and responsibilities differ among the study sites?* particularly through the social context presented in Sections 8.2 and 8.3 and assists the reader in understanding who the key actors are and at what levels and in what main foci they function. The third research question, **RQ 3** *Do the most relevant regulations (both formal and informal) which make up the policy framework for disaster risk management dramatically differ?*, is only indirectly supported through the brief mention of legal statutes or regulations within these social context sections. As a full and in depth analysis of the legal frameworks is not within the scope of the research pursuit, the reader should not expect to find such an analysis in this or further chapters. However, an annex is provided with a listing of relevant laws that have been found and considered throughout the course of this research (see Annex 14). Both RQ2 and RQ3 will be addressed and revisited in view of the results of the primary fieldwork in the comparative Chapter 12.

The present chapter first identifies the spatial boundaries of the selected case study sites and (focusing on a catchment based approach), what administrative “local” and “regional” levels are chosen. The selection and scope of spatial focus was necessary for investigating

and enhancing comparative potential, especially given the wide range of spatial scale of the case study sites as initially set by the CHANGES project. The selections also build upon EU frameworks, especially those supporting a basin focus, and observations from the preliminary fieldwork and site visits. Catchment maps for both main and satellite cases are provided and, although they are not identical in format, they communicate some general and essential characteristics.

The physical and social context summaries are provided in Section 8.3 and 8.4. The physical context includes background information regarding the general local, environmental characteristics including present hazards, presence of human settlement, economic and population dynamics, and important past events. This description is meant to provide a background of the current and changing environmental conditions. The social context includes a simplified table of actors at different levels within general fields depending on the main focus of actors' respective responsibilities: emergency management, planning and sectoral management, and administrative functions. This table is accompanied by a brief description of administrative delineations and the functioning of these actors at the different levels. The contents of the table and description are based on consideration of who are the key actors as a result of interpretation of data from initial literature and the preliminary and primary fieldwork. Both of these context parts in combination with the catchment boundary identification provide necessary background information needed to understand the general spatial context from which results are drawn and compared in later chapters.

8.1 Cases study selection and boundary identification

Physical characteristics served as part of the initial selection criteria determined by the CHANGES project, which included study areas that ranged from full administrative regions (e.g. Friuli-Venezia-Giulia region in Italy) to the level of an individual catchment (e.g. Wieprzówka catchment in Poland). The decision to focus on individual catchments at the local level and the delineation of the administrative boundaries within which to analyze governance processes was a course of action taken through the process of this dissertation. These catchments include the Nehoiu catchment in Romania, the Barcelonnette catchment in France, the Fella River catchment in Italy, and the Wieprzówka catchment in Poland. They reflect part, or at least in the lattermost case the entirety, of the CHANGES project study sites (see Figure 8.1 for general orientation). The decision to focus on a basin as a physical spatial boundary was based on policy and scientific reasons. The policy side of this rationale stems from Perambulatory Clause 13 of the EU Water Framework Directive (Directive 2000/60/EC) and Perambulatory Clause 3 of the EU Floods Directive (Directive 2007/60/EC), both of which stress the need for planning and measures to occur on the

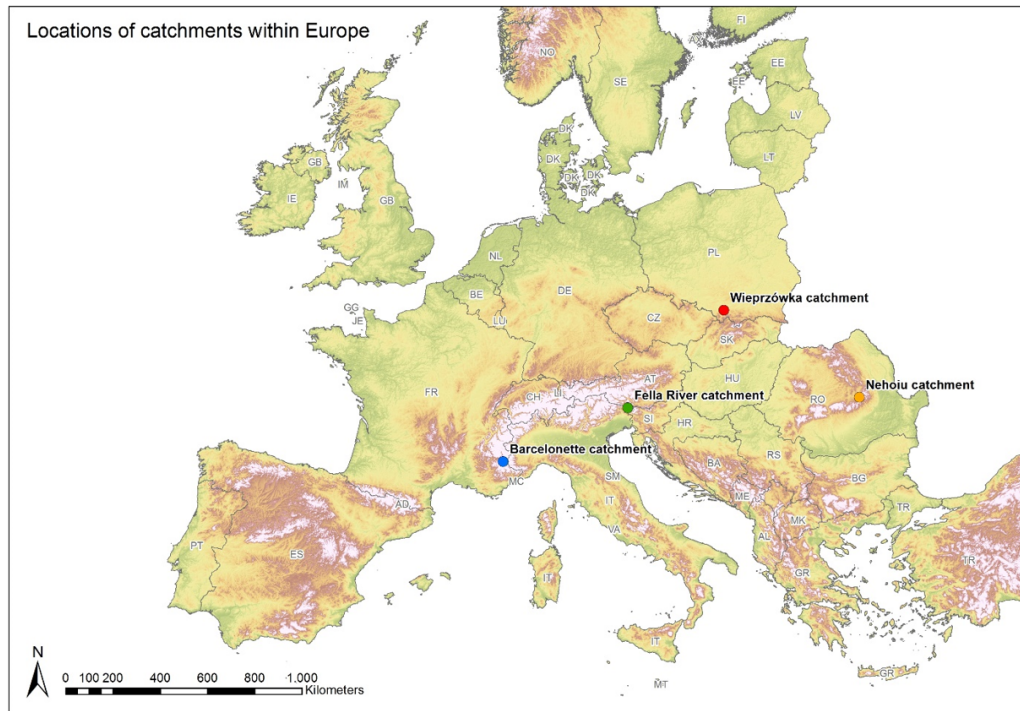


Figure 8.1: Map of locations of catchments. Created by Tjark Bornemann of the Technical University Dortmund, Institute for Spatial Planning (created for the purpose of this thesis, August 2016). Map shows locations of catchments with references to topographic structures. Barcelonnette and Fella River catchments in the Alps and Wieprzówka and Nehoiu catchments in the Sub-Carpathian Mountains.

basin level. The Water Framework Directive further provides a definition for sub-basins, which this research will refer to as catchments.¹

The scientific rationale for this refinement is that it provides a spatial focus and further helps in understanding the socio-ecological systems (Berkes et al. 2003) of the “place” in which communities live in close relationship to nature (Gardner 2015).² The selection also tried to maintain a local level focus to encourage a more bottom-up understanding and input into risk governance processes. However, one must understand the system and therefore at least consider higher levels that impact the local level directly. Therefore, in the course of selecting relevant stakeholders and actors, this selection also included higher

¹ After consultation of resources and terminology from the European Environmental Protection Agency, the US EPA, the IPCC, UNEP, and USGS, in addition to the above-mentioned directives, the research uses the term catchment to mean *an area of land in which water drains to a common terminus and then connects to another, larger confluence* and is taken to be synonymous with the term “sub-basin” as this is still a basin occurring within another, larger river basin.

² This term is well placed based on the attention to the integration of human and natural spheres in Berkes et al. (2003). See quote: “When we wish to emphasize the integrated concept of humans-in-nature, we use the terms social-ecological systems and social-ecological linkages...” (Berkes et al. 2003, p 3).

levels of administration that directly affect the local level decision-making process.

The chosen local level administrative boundaries relied on criteria and convenience sampling. As per criteria, they needed to lie within the selected catchment areas and to have had previously been affected by a major water-related disaster. This part of the selection process was largely influenced by a convenience sampling of local entities based on previously established connections through CHANGES project partners. The consideration of higher level administrative entities was based on the degree of direct influence (e.g. power and resources) on the decision-making power and capacities of the local levels. This was determined based on a desk study of the organizational structures and through a preliminary field visits. The results of the preliminary analysis helped determine the “appropriate level of analysis” through the use of an observational protocol. This helped establish an initial understanding for where resources and decision-making power lie at the local and regional (or higher administrative) levels. A listing of the catchments and the local and regional entities of the selected cases can be found in Table 8.1.

Case study country	Catchment	Selected local entities	Selected “regional” entities
Romania	Nehoiu catchment	town of Nehoiu	Buzău County
France	Barcelonnette catchment	commune of Barcelonnette commune of Faucon de Barcelonnette commune of Jausiers	Alpes-de-Haut-Provence Département
Italy	Fella River catchment	town of Malborghetto Valbruna town of Pontebba	Friuli-Venezia Giulia Region
Poland	Wieprzówka catchment	town of Andrychów (Wadowice County) town of Wieprz (Wadowice County) town of Stryszawa (Sucha County)	Małopolska Voivodeship

Table 8.1: Selected catchments and local and regional entities

For each case, a map of the catchment area is provided. The maps are not all the exact same format, but all serve the purpose of communicating the same important main points: to identify the boundaries of the catchment area and what are the main rivers, settlement areas, and national roads (acting as an important point for critical infrastructure) that are found within these boundaries. One can see that all areas contain settlements clustered and built up to the main rivers, with main roads running along these rivers. Regardless of scale, what is visible is the selected local level administrative entities are located within the confines of the catchment areas. The catchments differ in elevation, naturally as the Nehoiu and Wieprzówka catchments are located within the Sub-Carpathian Mountains and the Fella River and the Barcelonnette catchments are Alpine. Most contain more than one main local administrative boundary with the exception of the Nehoiu catchment (although there are multiple villages within the administrative delineation of the town of

Nehoiu). This is because the town of Nehoiu stretches and covers the majority of the Nehoiu catchment itself. The following short paragraphs provide a brief description of the location of the catchment areas and the selection of the local levels within these boundaries.

Romania (RO)

The Nehoiu catchment is part of the larger system of the Buzău-Ialomita Basin. The Nehoiu River running through the catchment area is a tributary of the larger Buzău River.

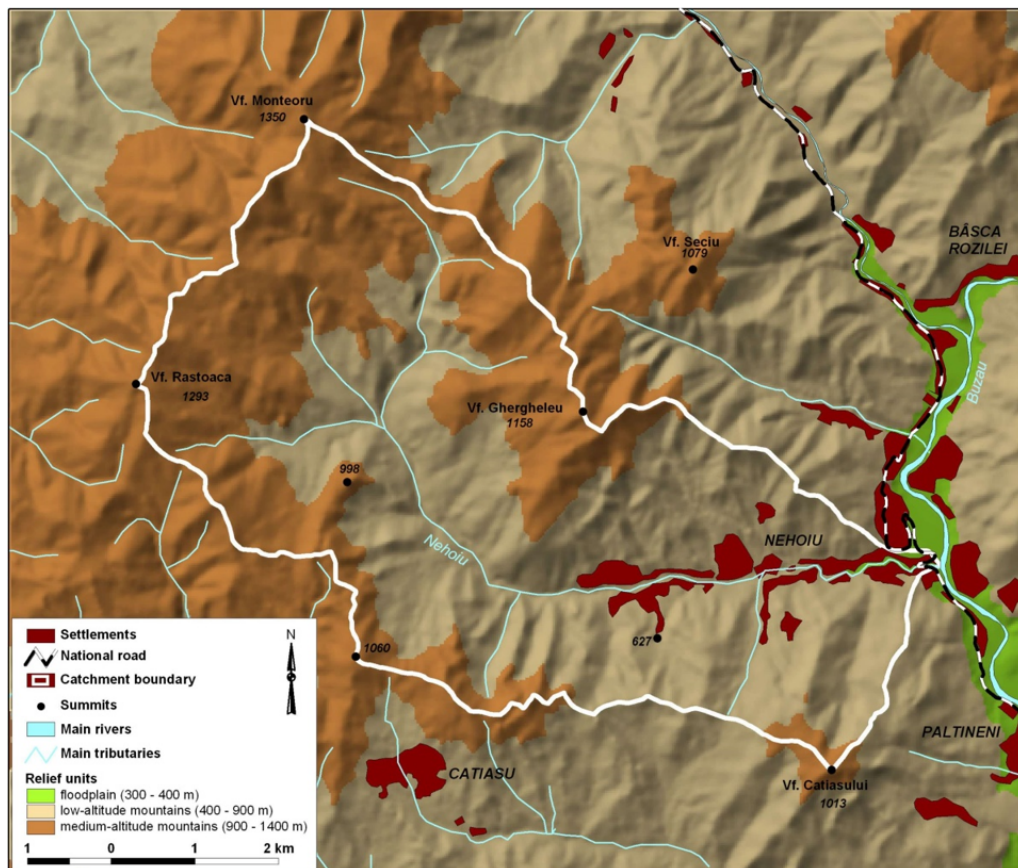


Figure 8.2: Map of Nehoiu catchment. Created by Dr. Mihai Micu of the Institute of Geography of the Romanian Academy (created for the purpose of this thesis, August 2015).

The administrative boundaries most corresponding to the catchment boundaries are that of the town of Nehoiu, a town within Buzău County, part of the South-East Development Region in Romania. Authorities from the county level (in the city of Buzău) were also considered and contacted. The “regional” level in this case is represented by the county. The reason for this is because it has most of the immediate resources used by the local level and provides direct influence into the decisions made. Therefore, the primary focus in terms of observations and interviews in undertaking this research was placed on the town of Nehoiu (including the community and its natural surroundings) and authorities at the

county level in Buzău.

France (FR)

The Ubaye River flows through the Barcelonnette catchment, the natural focus of the French case study site. The catchment is part of the larger Rhône-Méditerranée basin. The very local level within this catchment is represented by a structure of different communes.

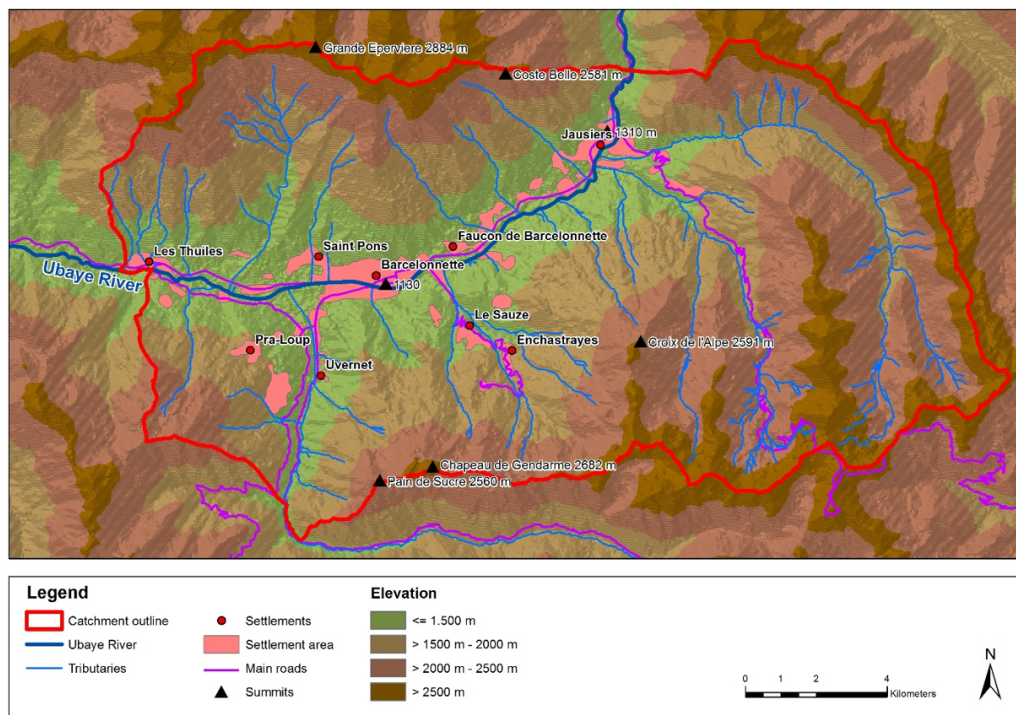


Figure 8.3: Map of Barcelonnette catchment. Created by Tjark Bornemann of the Technical University Dortmund, Institute for Spatial Planning (created for the purpose of this thesis, August 2016).

Those selected, again in large part through convenience sampling, are the commune of Barcelonnette, the commune of Faucon de Barcelonnette, and the commune of Jausiers. For comparability purposes, it was important to try to involve several communes as they are individually very small in area and in population and make up part of the local level administrative organizational structures. These communes are part of the canton of Barcelonnette (a division of an arrondissement usually made up of a number of communes). This canton is the sole canton of the arrondissement of Barcelonnette (an administrative division of the département), in the département of Alps-de-Haut-Provence within the région Provence-Alpes-Côte d'Azur.

Poland (PL)

Wieprzówka catchment is located within the Upper Vistula River basin. Two counties make up the area of this Wieprzówka catchment: Wadowice County and Sucha County. The towns of Andrychów and Wieprz (Wadowice County) and the town of Stryszawa (Sucha County) were the local entities chosen within these two counties. Stryszawa was chosen also as it is a more “rural” town in comparison to Andrychów and Wieprz and is appropriate in comparison with Nehoiu, Barcelonnette, and the Fella area, which also feature very rural areas.

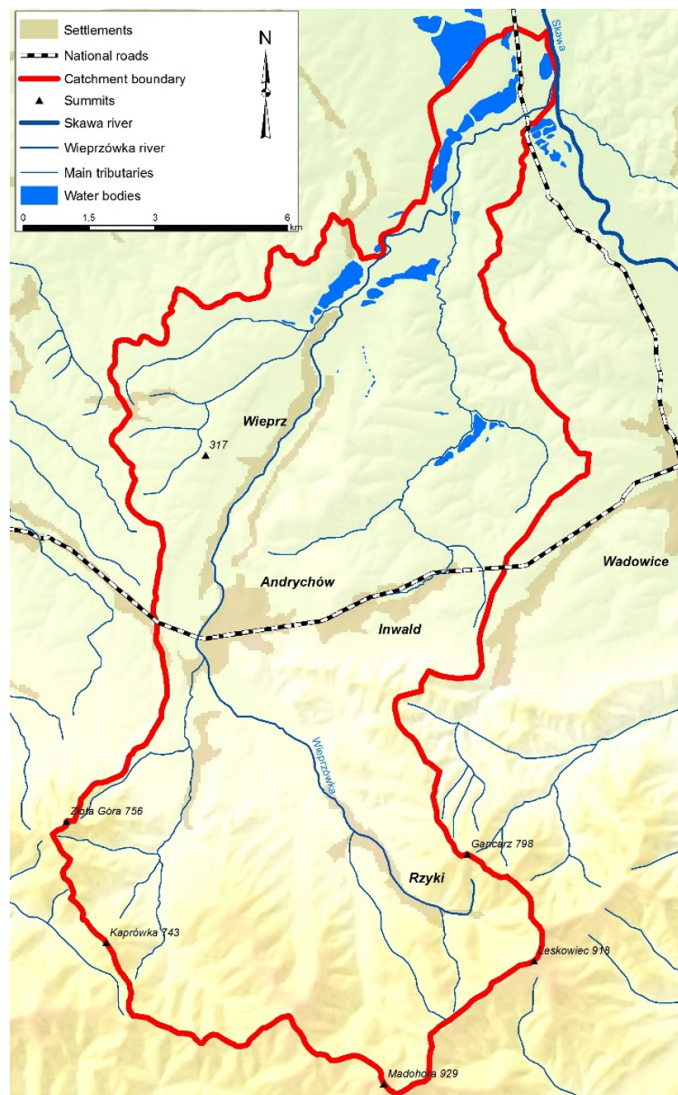


Figure 8.4: Map of Wieprzówka catchment. Created by František Imrich of the Institute of Urban Development (Instytut Rozwoju Miast IRM) (created for the purpose of this thesis, August 2016).

The counties lie within the Małopolska Voivodeship, which is one of the sixteen Polish provinces. The voivodeship serves as the “regional” entity for this case study. This was determined based on the fact that the counties serve more as coordinating bodies, which assist the quite powerful decision-making abilities of the municipalities.

Italy (IT)

The Fella River is a tributary of the Tagliamento River and its catchment is a sub-basin of the larger Tagliamento basin. The selected local level entities within the Fella catchment include the town of Malborghetto-Valbruna and Pontebba.

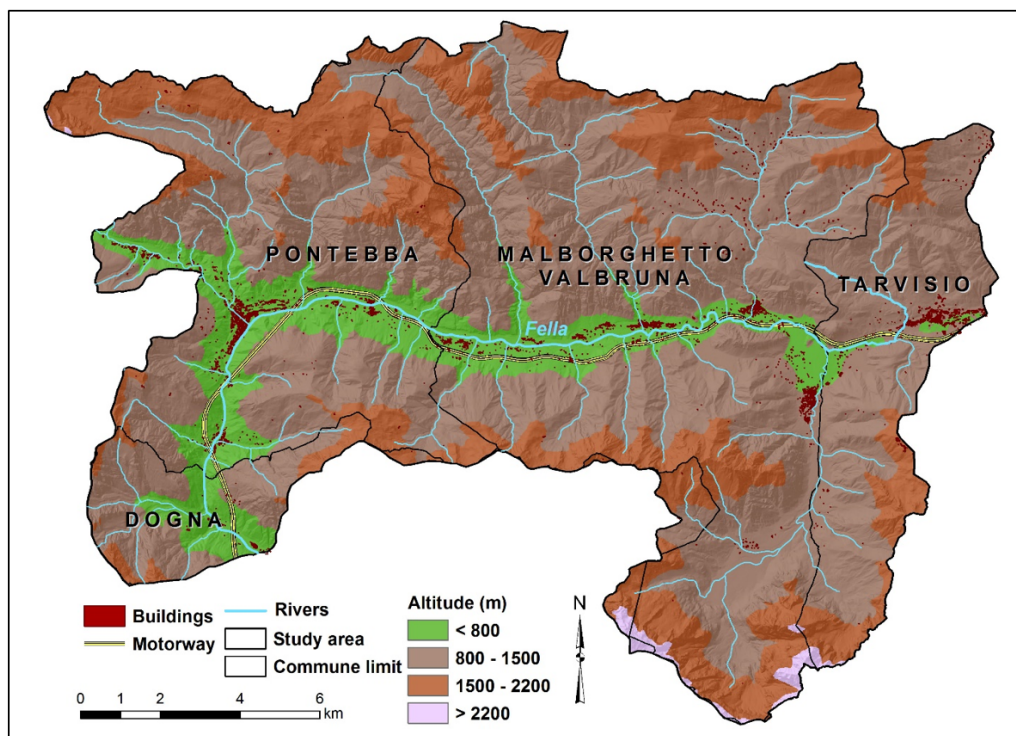


Figure 8.5: Map of Fella River catchment. Created by Dr. Roxana Ciurean of the University of Vienna, Institut für Geographie und Regionalforschung) (created for the purpose of this thesis, August 2016).

These neighboring towns are located along the Fella River and lie within the Province of Udine in the autonomous region of Friuli-Venezia Giulia. Due to the distribution of responsibilities and resources, authorities were contacted at the level of the region and few at the provincial level making the “regional” level of focus the actual autonomous region.

8.2 Structure and introduction to case study physical and social contexts

The four case studies presented maintain similarities in the physical characteristics and the common problems deriving therefrom. All lie within mountainous territory and offer what can be ideally termed as “difficult geographies” where the physical nature of the terrain as well as the climatic and weather patterns provide for extreme events with potentially high negative impact. The events occurring within these cases fall within the gamut of water-related extremes; namely, feasts and famines of water. All areas have experienced both drought and flooding within the same year. The issue at hand within the scope of this research focuses on the feast (or surplus water) events such as flash flooding and debris and mud flows, which are in the case studies often due to isolated cells of torrential rainfall. These events combine with the already unstable geological characteristics of the case studies, which provide both slow and fast moving landslides (mass movements of earth).³ The important point to be made is that all of these cases have been working to overcome challenges posed by these events. Building capacity to meet these challenges through “good” risk governance demands an understanding of the spatial context in each case, namely the physical and social inputs.

Information within the next two sections is presented in a simple and similar format to help enable a more comparative view of the different cases. The table of actors, for example, is presented in very simplified, brief summary to allow the reader a common structure in which to view the different cases and to have a general understanding of the main responsibilities of different actors and at what level they most commonly operate. To derive these tables, for each case an analysis was completed to highlight who are the key actors and how they are connected in terms of their roles and responsibilities through the aggregation of actor types into macro categories (see Table 8.2). This is determined based on the tasks they are charged with in accordance to regulatory standards as well as understandings of informal tasks practiced on a day to day basis. It should be understood that the tables do not represent an exhaustive listing of all potentially relevant actors involved in risk governance processes.

This analysis helped determine whether the actor’s primary responsibilities lie in administrative decision-making, planning and sectoral management, or emergency management. It is understood that many actors do not only function within one of the above cate-

³ An explanation of the differences between debris flows, mud flows, and landslides is not provided here as this is not the focus of the research. However, readers are encouraged to consult the wealth of literature covering this topic (see Glade et al. 2005; Dikau et al. 1996; Lee and Jones, David K. C 2004; De Blasio, Fabio Vittorio 2011, for further information).

Emergency management focus	Planning & sectoral management focus	Decision-making focus
<ul style="list-style-type: none"> ● Local Fire Brigade Volunteers/Professional ● Local Civil Protection/Emergency Management ● Police (local) ● Police (regional) ● Regional Civil Protection/Emergency Management ● Red Cross/Aid providing agencies ● Authorities involved in Hazard, Flood, or Natural Disaster Insurance 	<ul style="list-style-type: none"> ● Planners within Municipality Offices ● Environmental Protection Authorities (local officer) ● Private Planning Firm (e.g. includes architects and institutes contracted by municipalities) ● Regional Planning Authorities (e.g. government office) ● Regional Water (Basin) Authorities ● Geological Survey Offices ● Academia/Scientists ● Environmental Protection Authorities ● Forestry Authorities 	<ul style="list-style-type: none"> ● Mayors/Local Administrative Offices ● Municipal Technical Officers ● Community Leaders (e.g. church officials, heads of community centers or businesses) ● Regional Administrative Offices

Table 8.2: Aggregation of actor types into macro categories

gories. However, an attempt was made to demonstrate the category that most closely fits to the actors' primary functions in order to have a clearer understanding of how these actors are involved in decision-making activities within the broader frame of risk governance processes.⁴

8.3 Main case summaries: Nehoiu catchment (RO) and Barcelonnette catchment (FR)

Main cases are presented similarly to satellite cases, as an understanding of the spatial context is deemed important for all cases supporting the research findings regardless of whether equal depth is pursued in their investigation. In all cases, the media is also included within the listed actors for emergency management at all levels as they are key communicators of risk information, primarily during times of crisis. Additionally, all cases feature the public, particularly in reference to community leaders, as they play a role in influencing decision-making processes although the extent of influence can vary depending

⁴ For further information into the administrative, emergency, and planning system structures particularly with respect to the social contexts presented below, readers are encouraged to consult the text of CHANGES project Deliverable 4.1 (CHANGES 2012).

on the case study and available mechanisms for public involvement.

Summary: Nehoiu Catchment (RO)

Physical context characteristics

The Nehoiu catchment, located within Buzău County, Romania, lies in the Southeast Romanian Subcarpathians. The county itself possesses a range of different kinds of terrain including the Carpathian mountains and Subcarpathians which make up the north-western half of the county and features the Curvature sector of the Romanian Carpathians, part of the Vrancea Seismic Region (Micu 2011b). The southern half features flood plains and terrace systems three to four meters above ground level of the Buzău alluvial lands (Muică and Turnock 2008). The primary hazards in this region are earthquakes, landslides, flooding (especially flash flooding), and wildfires. In general, the entire county of Buzău is severely affected by landslides which are triggered by certain rainfall values and seismic activity, making the hill and mountain areas more vulnerable with respect to slope processes (Micu 2011a,b). Within the case study area, the Nehoiu catchment, the research focuses particularly on flash flooding and landslides as the key water-related extreme events affecting the local level.

Within this case study, landslides can cover an area more than two-thirds of the total area (Muică and Turnock 2008). Precipitation in this area is torrential during the summer season and often overlaps with spring snowmelt which can lead to extreme events including flash floods and landslides, with the highest landslide occurrence in June, May, and September (Micu 2011a; Ciurean et al. 2012).⁵ Resistance to erosion varies greatly in this area which features a wide range of soils, from clays and marls to sandstone and limestone, and has led to some river carving (Muică and Turnock 2008). Valleys continue to deepen and provide for a great transfer of materials from slopes to channels (Muică and Turnock 2008). With respect to natural and anthropogenic triggers, observations indicating a change in the local climatic conditions include slightly increasing annual mean temperatures, and a greater concentration of precipitation in short intervals which are more torrential in nature, as well as a decrease in general precipitation (Micu 2011b). These changing conditions encourage greater slope instability, providing for enhanced conditions for flash floods and landslides (Micu 2011b). It is important to consider the confluence of different, challenging physical factors with respect to these hazards and that these factors might change in the future, therefore altering their potential impact on different vulnerable elements.

⁵ Torrential within this context refers to 80-100 l/m² in a 24 hour period according to Micu (2011b).

With respect to physical vulnerability and vulnerable elements, human activities in this area are limited given the steep slopes and dense river system (Ciurean et al. 2012). The instability of the hillslopes have made for difficult and risky areas for settlement development, while providing enticing opportunity for subsistent farm development due to the moisture and fertility of the soil of landslide areas (Muică and Turnock 2008). Regardless of the presence of hazards, the population density has increased over time within the main valleys of Buzău County (including within the Nehoiu catchment) and has led to land degradation in the form of overgrazing, deforestation, overloaded slopes, and a change in drainage patterns (Micu 2011b). With respect to the general orientation of the settlement structure as it is located within catchment, one can see that the Nehoiu River runs through the center of the town. This river is the main tributary of the Buzău River and runs from the top of the catchment at altitudes of up to 1400 m (middle-altitude mountains) down to the floodplain at 300m. The vulnerable elements within this catchment include the settlement area that runs directly along the river and in tight density as well as the road system and several main bridges that run along the river up the catchment. These are lined by residential dwellings, storage spaces, orchards and other agricultural plots. Some parts of this settlement area (e.g. smaller villages attributed to the Town of Nehoiu) are relatively isolated and difficult to reach should any damage to the road occur. According to the National Institute of Statistics, the settlement areas making up the Town of Nehoiu are home to a population of approximately 11, 256 (Institutul National de Statistica 2015).

Within this population, many inhabitants maintain subsistence farming. This has been in the Sub-Carpathians a settlement pattern that can be seen in present day and dates back through the twentieth and nineteenth century, a time in which population pressure encouraged an "...expansion of subsistence farming from the major valleys on to the hillsides..." (Muică and Turnock 2008, p 28). These hillsides feature favorable conditions including a mild climate and access to extensive natural resources, encouraging settlement development and a relatively high population density (approximately 90 inhabitants/km²) (Micu 2011b). Interestingly, even the landslides themselves play an important role for settlement development because the fertility and moisture of the slopes are highly conducive for agricultural activities (Muică and Turnock 2008, p 34). However, this development has also caused land degradation, adding to greater slope instability and overall more risky development. Degradation of slopes through overloading, overgrazing, intensive agriculture, and especially deforestation via illegal logging are all contributing factors and have been emboldened by changing ownership and administration of lands post the 1989 Revolution (Micu 2011b). Major infrastructure has been built including transportation systems such as the railway and the national road, along with the county and municipal roads and bridge systems. This development, along with the development of housing investments, combines with the expansion of agricultural land on unstable hillslopes to produce a con-

text in which “hazards have become more significant today in the context of increasing investment in housing and infrastructure...” (Muică and Turnock 2008, p 33). There is a potential within this case for increasing risks in the present and near future given both the human and natural factors and change in these over time. It is important to note that this case is a rural area in a phase of depopulation, and though one might assume that this contributes to a potential lessening of future risk, the likelihood of a more extreme climate and more intensive weather patterns may aggravate impacts of exposed elements (Ciurean et al. 2012, p 3).

Major events:

In both 2004 and 2005, the case area received torrential rainfall with 2005 being the second highest recorded annual rainfall since 1975 in the Sub-Carpathians, triggering many landslides (Micu 2011a). In both years, major flash floods swept through the town of Nehoiu. This section gives a brief account of what occurred during this time and is supported by the input of key informants who were present during these events. The key informants providing input include: the head of the Nehoiu library (community leader), the head of the Nehoiu emergency volunteers, a landslide and geomorphology expert from the Institute of Geography, a Nehoiu police officer, the vice mayor of Nehoiu, the local environmental inspector, and a key officer within the upper management of the Emergency Situation Inspectorate of Buzău. This input included information gleaned from both preliminary fieldwork (in 2012) and from primary interviews (2013). A box summarizes and describes the main points for one of the most recent event in 2005 (see Figure 8.6).

With respect to the 2005 event, the force of the flash flood and debris it carried destroyed bridges along the valley, creating a domino effect as debris would pile behind one bridge until the bridge ruptured, taking with it additional debris to the next bridge until this too failed from the pressure of the flow. The flood (assisted by this blockage) caused overland flow and destruction to critical infrastructure, homes, and small businesses along the river. Additional hazards, especially landslides, were triggered during and after the event.

<p>Destruction:</p> <ul style="list-style-type: none"> - Bridges destroyed along the valley (domino effect from debris) - Critical infrastructure majorly affected, especially transportation - Homes and small businesses destroyed along the river (including garages, stables, houses, etc.) <p>Hazards:</p> <ul style="list-style-type: none"> - Flash flood and debris flow from torrential rainfall - Landslides occurred during and after the flood (caused by lateral erosion) <p>Funding:</p> <ul style="list-style-type: none"> - Need exceeds local level financial capacity - Funding and support given by the central government (visit from the Prime Minister) <p>Recovery:</p> <ul style="list-style-type: none"> - Recovery for access to basic services achieved in 2 to 3 days - Rebuilding completed several months after event

Figure 8.6: Past major events detail box for flash flood of 2005

Transportation was extremely limited; and because of this, it was difficult for authorities to reach and respond to all of the areas along the valley that had been affected. Aside from roads, other major infrastructure including water networks and electricity were also affected. The population tried to respond immediately and started reinforcing the river banks with sand bags. Several landslides occurred immediately after the flood as a result of lateral erosion. Both sides of the river started to collapse taking homes, garages, stables, and people. The mayor assembled a task force to evacuate people who were affected. Families were relocated and were given new homes with financial assistance from the national government. Deforestation also played a role in producing substantial debris that was moved and created a dam blocking the bridges. When the first bridge was broken, parts of this bridge along with the other debris pushed up against the houses and destroyed several homes. The local emergency management tried to remove debris along the river. However, the extent and intensity of the event overwhelmed local authorities. County level and national level authorities became involved in the response. The severity of the event was significant enough to draw the attention of the national government and the damage caused by this event was great enough to merit funding from the central (national) government and a visit from the Prime Minister.

Recovery of basic services from the event took two to three days, though it took several months longer for the town to return to normalcy. In looking back at the past events, a summary of a local shop owner's experience reflects the perception of one affected individual as she described how in the 2005 event, mud filled the rooms on the first level of her building. This was a surprise and was very fast, giving no one time to react. She ran

for higher ground as the mud and debris encircled and engulfed her shop and home. The individual explained: "It was a situation where you run and save yourself or die" (Transcript R-21 Nehoiu Shop Owner). Though this is a very direct and highly intense recount of this individual's experience with this extreme event, it is important to note that this same individual also reflected on how she does not expect that this will happen again in her lifetime.

Social context characteristics

This section communicates the basic parts of the social context for the Nehoiu catchment. Table 8.3 demonstrates that, within this case study, there is only one "sub-national" level with respect to the administrative divisions of actors. This is unique as compared to the other cases. These regions are NUTS II statistical units and, according to Article 2 of the Law on Regional Development in Romania (Law No. 151/July 15, 1998), function primarily to balance regional differences in development, prepare institutional frameworks to meet European Union criteria, regional correlation of government activities, and stimulate interregional cooperation (Surd et al. 2011; Romanian Chamber of Deputies July 16, 1998).⁶ Though Development Regions exist within Romania, these regions do not contain comparative functions to other "regional" delineations, they do not maintain any administrative status nor do they possess any legislative powers. Administration at the county level is similar and historically based on the French model of government from the French 5th Republic. This level houses both a Prefect (acting as representative of the state) and a County Council (serving primarily as administration for municipalities and communes). Since the fall of the Communist era in 1989, efforts toward decentralization have been made and self-governing powers given to the County Council and the municipalities (the self-governing entities) (Chamber of Deputies of the Parliament of Romania 2003). The local level represented in the table reflects the Town of Nehoiu and its villages (smaller entities administratively belonging to the township), while the "regional" level is represented by Buzău County as the most appropriate and most immediate sub-national level. The national level is also represented to provide the highest level of administration and to help the reader understand who are the entities that provide the broader regulatory framework and contribute to the assumed trickledown effect of policy and action implementation.

⁶ Romania joined the EU along with Bulgaria in January of 2007 (EU 2016b).

Emergency management focus	Planning & sectoral management focus	Administrative decision-making focus
Local level (towns in the Nehoiu Catchment)		
<ul style="list-style-type: none"> • Local Emergency Volunteers • Local Committee for Emergency Situations • Local Operative Center • Town Police • Media 	<ul style="list-style-type: none"> • Town Planners • Local Environmental Inspector 	<ul style="list-style-type: none"> • Public/Community Leaders • Mayor • Vice-Mayor • Municipal Technical Officers • Local Council • Village Representatives
Sub-national level (Buzău County)		
<ul style="list-style-type: none"> • Emergency Situation Inspectorate Buzău (ISU Buzău) • Regional Operative Room (SOR) • County Committee for Emergency Situations • Red Cross • Caritas • Police • Media 	<ul style="list-style-type: none"> • Buzău Environmental Protection Agency • Environmental Guard • Private Forestry Agencies (or Districts) • Private Planning Firms • Office for Cadastre and Land Registration • Chief Architect (Directory of Territorial Management and Urbanism) • Buzău Ialomita Branch of the Romanian Waters National Administration 	<ul style="list-style-type: none"> • County Prefect • County Sub-prefect • County Council • Council President • Council Vice-Presidents • County Secretary • Administrative Directorates*
National level (Romania)		
<ul style="list-style-type: none"> • General Inspectorate for Emergency Situations (IGSU) • National Committee for Emergency Situations (Committees for Emergency Situations, Ministerial Operative Centres, General Inspectorate for Emergency Situations (National Operative Center) - Professional Public Services and organizations - On Site Commander) • Red Cross • Caritas • Media 	<ul style="list-style-type: none"> • Institute of Geography of the Romanian Academy • Geological Institute of Romania • National Hydrological Institute • National Meteorological Administration • Romanian Waters National Administration • National Environmental Guard • National Insurance Association (PAID) 	<ul style="list-style-type: none"> • President • Government Cabinet (Prime Minister and Council of Ministers) • President of the Council of Ministers • Bicameral Parliament (Chamber of Deputies and Senate)

*These directorates include: Economic, Judicial and Local Public Administration, Heritage and Investment Administration, Regional Development, Territorial Management and Urbanism

Table 8.3: Groups and primary function foci for local and regional level risk management in Nehoiu catchment, Romania.

At the local level, the decision-making actors consist primarily of the mayor, vice-mayor, the local council, and village representatives. The mayor, however, is the authority responsible for granting (or denying) project and building permit requests at the local level, with specific exceptions such as if the request is for a large industrial site (this request is

then directed to the County Council). The village representation system acts as a conduit for risk communication between the smallest of organized entities (villages) and the township. Village representatives are often individuals who have been born and raised within these villages and (or at least) know the village well and are entrusted to represent its interests and issues to the town hall. These issues also include problems such as mass movements, or cracks in structures indicating these movements, occurring throughout the village's terrain. The representatives hold positions within the township, and support the decisions made by the local council and the office of the mayor. These entities are further supported by the planning and sectoral management authorities, including private forestry agencies which operate at the town level as well as across larger territories. These include the town planners working within the Urbanistic Department of Nehoiu (focusing on spatial planning and territorial development) and the local environmental inspector (focusing on environmental protection and activities at the local level). Several entities also make up the local emergency management support. The primary body responsible for this support is the local committee for emergency situations, whose membership includes: the vice-mayor, local emergency volunteers (often village representatives), and other representatives from public institutions. Other supported institutions within the field of emergency management include the local police force, who are chiefly responsible for the flow of traffic during an emergency and immediately after an event. There is also a special unit called the Gendarmerie with specific competences for mountain rescue, and especially for reaching isolated persons.

The County of Buzău makes up the "regional" level and houses a number of planning and sectoral management entities including the Buzău Environmental Protection Agency, the Buzău offices of the Environmental Guard, as well as the Buzău Ialomita Branch of the Romanian Waters National Administration. The Buzău Environmental Protection Agency (Agenția Regională de Protecție a Mediului Buzău) takes part in environmental assessments and acts as an overseer for projects and plans. The director of this agency is also a member of the County Committee for Emergency Situations. The agency provides technical assistance in the case that a measurement or laboratory work is requested by the Environmental Guard and acts as a source of expertise especially in the case of a quality assessment (e.g. in the case of soil or water pollution). The Environmental Guard is an enforcement body controlled by the Ministry of the Environment and works with forest districts as well as the Environmental Protection Agency and the Emergency Situation Inspectorate Buzău (ISU Buzău). The Buzău Ialomita Branch of the Romanian Waters National Administration is charged with water resource conservation and management, especially water quality as well as prevention and defense against floods and pollution. Private planning firms operate on both the local and county levels (and in some cases at the national level), providing assessments for plans and projects, including the technical

expertise and resources to create maps for the local level.

The county level administrative authorities are made up of the Prefecture and the County Council. The Prefect operates as the President of the County Committee for Emergency Situations (although the Prefecture administration is involved in prevention, response, and recovery), and the President of the County Council acts as the Vice President. The committee includes: the prefecture, the county council, ISU Buzău, state institutions such as factories, and large institutions such as the military. ISU Buzău provides a permanent secretariat for this committee. Threats that arise are analyzed by support groups. There is, for example, a support group that is dedicated to chemical accidents, one that is for landslides, one for floods, one for fires, and one for earthquakes, etc. Each of these support groups includes trained personnel from each field. These support groups are made up of both members of the committee and consultants. A member of the committee leads the support group. The consultants can come from institutions which have an interest in the field addressed by the group. There are also technical support groups with specialists outside of the prefecture or the county acting as advisors to these groups.

For emergency management at the county level, ISU Buzău is the primary actor and provides the bulk of activities and resources (personnel, equipment, etc.) for managing both local level (individual town, and multiple towns) and county level events. In practice, this actor also takes over responsibilities that would otherwise be completed by trained local technicians. However, lack of local level capacity has equated to far greater reliance on ISU Buzău.⁷ The Red Cross plays a supporting role within the County Committee of Emergency Situations. They are involved at the county scale in Buzău but also assist neighboring and other counties in Romania. The Institute of Geography of the Romanian Academy (IGRAC) operates at multiple levels and with a variety of actors and provides technical support for landslide risks and hazards for the County Committee of Emergency Situations. When requested, IGRAC provides scientific advice and information for ISU Buzău and for the Prefecture (e.g. field assessments for reactivations of mudslides). The Geological Institute of Romania, similarly to IGRAC, works at both local and regional scale, contributes technical expertise, creates geological maps, and is often commissioned for assessment projects with private companies.

The county level also contains the Office for Cadastre and Land Registration, which works with land use change from agricultural to non-agricultural land due to landslides. This office is sometimes consulted with regard to where people should be relocated in the event of a flood (as occurred during flood events in 2000). The Office of the Chief Architect of

⁷ This authority is the result of the combination of two previously separate authorities: the fire department, and the civil protection.

the County Council is also found at this level and provides the final approval of General Urbanistic Plans created by the municipalities (or towns). This approval is given after all other permissions have been granted and collected from the other required offices. The office focuses on built up areas and the requirements that must be fulfilled for the construction of these areas.

At the national level, the key administrative decision-making bodies include the President, the Government Cabinet (Prime Minister and Council of Ministers), the President of the Council of Ministers, and the Bicameral Parliament (Chamber of Deputies and Senate). In the case that a situation exceeds the capacity of the county level the county committee informs and transmits the information to the Ministry of Internal Affairs. In this case (in which the issue has surpassed the county level), the Prime Minister, the Minister of Internal Affairs, or the Minister of Public Works meet and discuss via video conference with the County Prefects.

The National Committee for Emergency Situations is comprised of the Committees for Emergency Situations, the Ministerial Operative Centres, and the General Inspectorate for Emergency Situations which acts as the On Site Commander for the National Operative Center for the Committee. The Committee is also supported by the Professional Public Services and Organizations branched under the Ministry of Administration and Interior including the National Hydrological Institute, the National Meteorological Administration, and the Romanian Waters National Administration. The General Inspectorate for Emergency Situations (IGSU) is the national level civil protection entity and also operates under the Ministry of Administration and Interior.

There is also a national level Natural Disaster Insurance Association (Pool-ul de Asigurare Impotriva Dezastretor Naturale S.A. or PAID), which is a pooled insurance association made up of many insurance agencies which operates at the national level. The law regarding disaster insurance at the state level (Lege 260/2008) was established in 2008 and states that natural hazard insurance for households is mandatory (although this was amended in 2011 to permit individuals to purchase insurance policies outside of the agencies that are part of the PAID) (MRN 2012). This insurance pertains specifically to flooding, landslide and earthquake hazards. According to the law, landslides, earthquakes and floods are required to be covered but not others (other coverage can be purchased through additional, supplementary insurance).

Summary: Barcelonnette catchment (FR)**Physical context characteristics**

The Barcelonnette catchment is located in the south east part of the French Alps, following along the Ubaye River and its many tributaries. One can see from the catchment map (see Figure 8.1) that the settlement areas including the communes of Barcelonnette, Faucon de Barcelonnette, and Jausier run right up to the Ubaye River on both sides. All three communes lie within the floodplain of the Ubaye River and have very limited developable land as the flat terrain along the valley floor has been extensively developed, leaving only slope areas with potential for further development. The major road, National Route 100,⁸ is also built along the main river and serves as a very critical point of infrastructure that, if made impassable, would isolate the valley and would require inhabitants to take alternative routes through the neighboring Italian border. The climate of the area is described as Alpine with a Mediterranean influence featuring high variability in annual rainfall between 400mm to 1300 mm per year (Thiery et al. 2007), and also faces intense thunderstorms (Malet et al. 2008). Mean temperatures are around 7.5 degrees Celsius (+/- 1.3 degrees Celsius), with snowpack in the upper slopes for between four to six months of the year (Malet et al. 2008). The area also faces intense thunderstorms. Maximum rainfall typically falls within autumn and June, with rainfall in the summer normally torrential in nature (Bhattacharya 2010). There are substantial differences in the temperature of slopes that are exposed to sun and those that remain in shade (Bhattacharya 2010), and also differences in average rainfall between the Barcelonnette and Jausiers communes (Faucon de Barcelonnette is located between the two) as they are in different parts of the valley's topographical configuration (Flageollet et al. 1996).⁹ The Sirocco wind comes from the south though the valley. This is a warm, dry wind and is an effect of the Mediterranean climate influence, accelerating snowmelt and leading to high discharge and inundation of the Ubaye River in springtime (Bhattacharya 2010).

The area faces a number of hazards including: floods, torrential floods (which are often occurring along the smaller torrents flowing into the Ubaye River), mudflows (high risk for example with the Bachelard and the Gaudissart torrents), landslides, earthquakes, and forest fires. The lattermost is considered to be of very little concern to the territory relative to other hazards (Commune de Barcelonnette 2013). Flooding on the Ubaye occurs in a progressive manner during a period of heavy rainfall over a long duration and or during snow melt (Commune de Barcelonnette 2013). Historically, torrential flooding has proven to be the most often documented type of hazardous event since the mid-1800s (Flageollet

⁸ Now known as Départemental 900 or D900.

⁹ According to Flageollet et al. (1996), the commune of Jausiers receives on average 6.5% less rainfall than that of Barcelonnette.

et al. 1996). The area experiences isolated, heavy precipitation events that can result in the overtopping of the main river. These events can also trigger debris flows, mud flows, and flash flooding along the torrents. Landslide activities in general in this area tend to be correlated with years with excess rainfall but also occur during dry periods, which is especially evident with the historical data of the La Vallette landslide (Thiery et al. 2007; Flageollet et al. 1996). The catchment area is steep and features several slow moving landslides with many different factors contributing to slope instability including the influence of glaciation and highly variable lithologic structures laden with black marls and flysch, both of which are erodible and contribute to severe gully erosion (Malet et al. 2008; Bhattacharya 2010).

Another influential factor and one which carries great historical significance is intense deforestation and general changes in land use practices. Leading up to and including the 15-16th Centuries, the Ubaye Valley was overpopulated and autonomous, based on a rural economy of sheep-breeding and weaving, as well as smaller industries like textiles, crafts, and agriculture (Weber 1994). During this time these activities led to widespread deforestation and soil erosion and, to provide some remedy, local laws regarding regulation of timber production and the transport of animals were enacted (Weber 1994). However, by the 19th Century activities of agro-pastoral communities led to intense gullying and landslides (Malet et al. 2008). In the mid to late 19th Century, the area became open and much more accessible via the construction of National Route 100, which runs along the bottom of the valley and provided a key connecting route to roads all throughout the valley. This construction assisted in the massive outmigration of the population to Mexico in the 19th and 20th Centuries, many of whom left for trading purposes bringing back aspects of traditional Mexican culture (e.g. influence on architecture, especially large villas throughout the town). The extent of this outmigration was substantial. The population in the 1830s was nearly 15,000 inhabitants but was depopulated over the next 100 years and by the late 1960s was reduced to 6,350 (Weber 1994). This outmigration had ripple effects, including a strong rural exodus leaving many abandoned homes, fallow fields, and unkempt roads throughout the countryside, consequently creating problems such as overflows and landslips from the streams and rivers previously maintained by these inhabitants (Weber 1994). At the same time as this exodus, there was also an era of intense reforestation throughout the entire Ubaye Valley (Weber 1994; Malet et al. 2008). Reforestation was used for bioengineering protection measures, which altered some smaller sub-catchments and generated a change from 5-10% forest cover to 55-60% forest cover in these sub-catchments (e.g. Riou-Bourdoux catchment featured on cover page) (Malet et al. 2008). Hydraulic engineering methods (e.g. check dams of stone and concrete) have also been implemented in the streams and torrential fans, as well as levees and erosion control banks (Malet et al. 2008). The Barcelonnette catchment area has around 900 dams, and

each year a budget of one million euro is used for construction and replacement of dams, enabling the construction of between five to 10 dams per year (Malet et al. 2008).

At present, the economy depends on tourism as its largest economic sector and no longer relies on agriculture and farming as primary economic inputs (Weber 1994), although this still remains a large part of local culture. The development of tourism has also had a negative impact on the environment, especially in the form of road widening and construction as well as slope cutting and terracing for ski resorts. However, some measures are being taken to make this sector more sustainable (Bhattacharya 2010). In the area in general, there are common outdoor activities and attractions including hiking, rafting on the Ubaye, cycling, rock climbing, and paragliding (Barcelonnette Office de Tourisme n.d.). In order to give an idea of how important tourism in this area is, the Ubaye Valley is currently stated to possess 40,000 beds for tourism (Bhattacharya 2010) and the population is estimated by local officials to increase by roughly 10 times the current number of inhabitants in the winter tourist season (Preliminary field visit to Sous-Préfecture de Barcelonnette 18 April 2012). The population on the scale of the Community of Communes of the Ubaye Valley (CCVU), however, has been in decline since the dissolution of the 11th Bataillon de Chasseurs Alpains in 1991 (Commune de Barcelonnette 2015).¹⁰ According to the National Institute of Statistics and Economic Studies (Institut national de la statistique et des études économiques or INSEE), the current population for the CCVU communes together is 7,351 with Barcelonnette at a population of 2,804 inhabitants, Jausiers at 1,168 inhabitants, and Faucon de Barcelonnette at 319 according to 2013 census data (INSEE 2013d; INSEE 2013); INSEE 2013); INSEE 2013).

Major events

Historical records indicate regular flooding events tracked back to the year 1714 (Flageollet et al. 1996). Since 1859, there have been over 100 debris flows and approximately 500 torrential floods (on record) (Malet et al. 2008). In the whole catchment, there are 26 different torrents prone to debris flows (Malet et al. 2008). One of the most recent debris flows was the Faucon Torrent in 2003, which moved a total volume of approximately 100,000 cubic meters of material, causing roughly 2.5 million euro in damages and especially damaging the housing found along the debris fan (Malet et al. 2008).

The most recent major flood events occurred in 1994 and 2008 with the most dramatic event in living memory in 1957 (Flageollet et al. 1996). This brief section focuses on the

¹⁰ The CCVU (in French, the *Communauté de Communes vallée de l'Ubaye*) is comprised of the following communes: Barcelonnette, Jausiers, Saint-Pons, Faucon de Barcelonnette, Les Thuiles, La Condamine – Châtelard (Sainte – Anne), Uvernet – Fours (Pra Loup), Enchastrayes (Le Sauze), Méolans Revel, Le Lauzet Ubaye, Val d'Oronaye (Larche and Meyronnes), Saint Paul sur Ubaye, and Pontis (CCVU)

1957 event as this is one of the most important historical events (very well known) and is one which is communicated by local authorities and community leaders to the public in order to keep the disaster memory of these potential events alive and to build awareness.

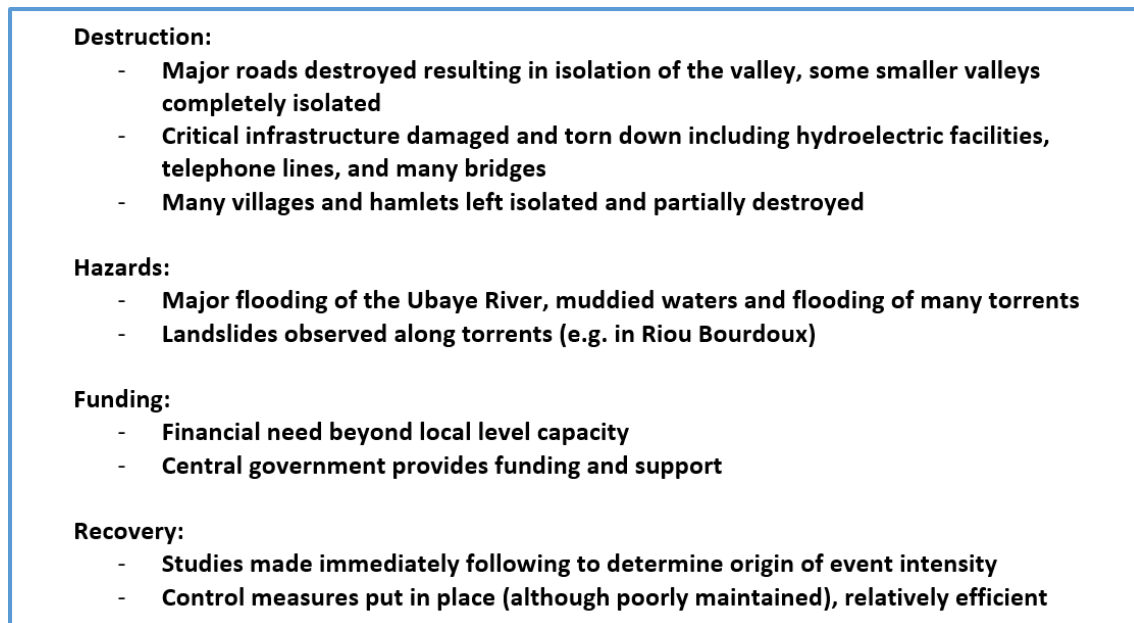


Figure 8.7: Past major events detail box for historic 1957 centennial flood

The centennial flood that occurred on the 13th of June 1957 was a catastrophic flood that affected multiple valleys (including the Guil, the Cerveyrette, and the Ubaye valleys), completely isolating some smaller valleys (like the Queyras within Guil) (Tricart 1958; Sivan 2000). It ripped out kilometers of roads, telephone lines, took out many bridges, and partially destroyed many villages and hamlets (Tricart 1958). In general, floods in the middle of June of 1957 affected many of the rivers of the French Alps including: the Var, the Tinée, the Ubaye, the Guil, the upper branches of the Durance river (Durance, Cerveyrette, Clairée), the Arc and the Isère (Tricart 1958). In the Ubaye, damage was done to hydroelectric facilities and mills. The cause of the event was a confluence of a number of factors including the exceptionally intense rate of precipitation, saturated soils (previous rainfall had already saturated soils by June 12th), strong winds from the South or Southeast which played a large role in the localization of intense rainfall, as well as rapid snowmelt (Sivan 2000; Tricart 1958). These factors are typical of springtime floods in these areas, following the typical regime. However, the intensity is what seemed to produce the catastrophic magnitude of the event. During this event, and in general, when the rivers of the Ubaye overflowed into the villages the tributaries of the river were also affected. This, for example, can be seen in the muddied waters and mass movements that were observed at the Riou Bourdoux. The streets of Jausiers were inundated, Barcelonnette

was also inundated, crops were submerged, and the National Road 202 was cut off (Sivan 2000). Many control measures were put in place post-1957 event and, even in view of poor maintenance, have been considered relatively efficient in comparison to areas in which no measures have been implemented (Arnaud-Fassetta et al. 2005).

Social context characteristics

One can see from the table below that the administrative structure for the French case study site is somewhat different than that of the Romanian case study site. In general, there are more administrative delineations in the French case. The very local level is comprised of villages and hamlets, followed by communes and municipalities. What is important to note within this case is that the entity of the commune has historically until present been considered an important local entity and source of identity. This administrative entity was created in the late 1700s, without any requirement for a minimum population (UN 2006). This is why in France, in general, there are many communes with populations of less than 1000 that have retained their identity for hundreds of years. There has more recently been a push to have fewer small communes and more intercommunal organizations, for example through communities of communes (CCs). Though not an official legally required administrative level, within the case of the Barcelonnette catchment area, intercommunal administrative and organizational bodies exist, including the Community of the Communes of the Ubaye Valley (CCVU) and the Syndicat.¹¹

Communes make up what are called *arrondissements*, which roughly translates in English as “districts”. In the case of the Barcelonnette catchment, the selected communes of Barcelonnette, Faucon de Barcelonnette, and Jausiers are all part of the *Arrondissement* of Barcelonnette (INSEE). The *arrondissements* make up the *départements* with a Sub-Prefect (in French *Sous-Préfet*). The Sub-Prefect is also located within the commune of Barcelonnette, but is a *départemental* administrative body. The prefecture is located in a physically different location from the local level. The Prefect (*Préfet*) operates on the *département* level, in this case at the *Alpes-de-Haute-Provence* *département*. After the *département* level is the *région* *Provence-Alpes-Côte d’Azur*, commonly abbreviated as PACA which also has a Prefect as acting head of administration. This is the level immediately below the national government. The levels of *région*, *département*, and municipalities (or communes) represent self-governing entities, granted autonomy in territorial management and budget among other powers (UN 2006). A brief explanation of the different actors at these different levels is provided in the following paragraphs.

¹¹ *Syndicats* are associations established by communes for a cooperation of specific services of interest and operate alongside other intercommunal groups or ensembles but do not necessarily have an administrative nature (*Association des Maires de France et des Présidents d’Intercommunalité (AMF)* n.d.).

Emergency management focus	Planning & sectoral management focus	Administrative decision-making focus
Local level (communes within the Barcelonnette Basin)		
<ul style="list-style-type: none"> • Municipal Professional Fire Brigade • Local Civil Protection Volunteers • Civil Fire Brigades Centre (SDIS) • Gendarmerie (police force, including specialized mountain unit of military officers called the PGHM) • Red Cross • Media 	<ul style="list-style-type: none"> • Local Level Forestry Agency (RTM) • Scientists/Academia (at Séolane Barcelonnette) 	<ul style="list-style-type: none"> • Public/Community Leaders • Mayors • Adjoints (Municipal Officers) • Municipal Council • Mixed Sydicate • Community of Communes of the Ubaye Valley (CCVU) • Sub-Prefect
Sub-national level (counties and region) (Alpes-de-Haute-Provence Département)		
<ul style="list-style-type: none"> • Departmental Level Fire and Rescue Services (CODIS) • Operations Centre of the Fire and Emergency Services • Interdepartmental Crisis Management Operations Centre • Red Cross • Caritas • Media 	<ul style="list-style-type: none"> • Departmental Direction of the Territories (DDT) • Regional Level Agency Forestry (RTM) • Scientists/Academia • Urbanistes (spatial planners) & Private Planning Firms 	<ul style="list-style-type: none"> • Départemental Prefect • Département-Level Assembly
(Provence-Alpes-Côte d'Azur Région)		
<ul style="list-style-type: none"> • General Secretariat of the Defense Zone • Civil Security Zone Headquarters Staff • Zonal Defense Operations Centre • Interregional Civil Security Operational Co-ordination Centre (COZ) • Red Cross • Caritas • Media 	<ul style="list-style-type: none"> • Regional Direction of the Environment, Development, and Housing (several relevant services within this Directorate) 	<ul style="list-style-type: none"> • Préfet de Région (state representative/administration) • Administration of the Region (local administration) • Regional Level Assembly
National level		
<ul style="list-style-type: none"> • Directorate of Civil Defense and Security (DSC) (supported by CODIG) • Interministerial Operational Crisis Management Centre (COGIC) • Civil Protection (primarily volunteer based) • Red Cross • Caritas • CRS Montagne (specialized members of National Police, collaborate with PGHM) • National Gendarmerie • Media 	<ul style="list-style-type: none"> • 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) • Agence de l'Eau Rhône-Méditerranée Corse (water agency for south-east regions) • Météo France (French Meteorological Survey) 	<ul style="list-style-type: none"> • President • Prime Minister • Council of Ministers • Parliament (National Assembly and Senate) • Ministry of Ecology, Sustainable Development, Transport and Housing (MEDDTL)* • Ministry of the Interior

*Includes the General Directorate of Prevention of Risks (DGPR)

Table 8.4: Groups and primary function foci for local and regional level risk management in Barcelonnette catchment, France.

At the local level, decision-making in peacetime and during crisis is primarily the function of the mayor, working in cooperation with the municipal (or commune) council, with the assistance of municipal officers called “Adjoints”. The First Adjoint serves as a first deputy to the mayor. This person as well as other Adjoints have specific tasks; for example one Adjoint will be charged with social affairs and education on behalf of municipality, and another will be responsible for culture and tourism, and another for work, environment and technical personnel. Municipal planning is also within the purview of one of these deputies, although the decisions to grant construction permits are given by the mayor. For emergency management at the local level, there are a wide number of actors including both professional and volunteer fire brigades, the Gendarmerie (police force). In the case of an event, should the capacity of an individual commune be exceeded or should multiple communes be affected, the Sub-Prefect acts as the primary decision-maker. Within the case study area there is also the Civil Fire Brigade Center (the SDIS, referred to as SDIS Barcelonnette throughout the rest of this thesis) and a special unit of the Gendarmerie called the Peloton de Gendarmerie de Haute Montagne (PGHM) which focuses on mountain rescue and security. Unique to this local level is also a research center based at Séolan Barcelonnette (an area that was previously used for housing military and now serves as a center for research and as a new crisis management center). Much of the research focuses on the assessment and monitoring of mass movements in the catchment and in neighboring areas. Within the gamut of actors for planning and sectorial management, a strong, and one of the most important actors for risk assessment, is the Restauration des Terrains en Montagne (or Restauration of Mountain Terrains, RTM), which is a service of the state provided through the Office National des Forêts (or National Forestry Office, the ONF) with local technicians operating on the level of the Ubaye Valley and providing assistance to commune authorities as well as a wide range of other actors.¹² External consulting firms (often private planning firms) are hired by the commune to provide studies for projects and plans and to assist in providing information for public consultation.

Within the investigated case study area there is also a community of communes called the Communauté de Communes Vallée de l’Ubaye (the Community of Communes of the Ubaye Valley, CCVU) which maintains obligatory competencies in spatial management and economic development and optional competencies in the environment, culture, and sports ((**alias?**)). There is also the intercommunal association of the Syndicat Mixte de Protection contre les Crues dans le bassin de l’Ubaye – Ubayette, which is an association formulated by the communes of the Ubaye for the purpose of protection against floods in the Ubaye and management of the rivers of the Ubaye ((**alias?**)).

¹² Although the scientists and RTM are not necessarily “local” like the mayors, this is a level at which they perform many of their regular tasks.

At the département level, the main decision-maker in terms of administrative decision-making is the départemental Prefect who serves as a state representative and can also in a time of crisis enact the ORSEC plan, used for organizing public and private aid. This level also includes the département assembly known as the Conseil Général and in this case is the Conseil Général des Alpes-de-Haute-Provence, which includes different technical offices. Emergency management is coordinated by the Départemental Level Fire and Rescue Services, called SDIS 04 with the number referring to the number of the département. The Operations Center of the Fire and Emergency Services and the Départemental Operations Center are also found at this level and are housed at Digne-Les-Bains. Many services for various sectors and planning are also found at this level, one of the most relevant include a départemental direction focused on territorial management called the Direction Départementale des Territoires (Departmental Direction of the Territories, DDT).

The région also features a number of directorates, including the Direction de l'Habitat, de l'Urbanisme et de l'Aménagement Urbain and the Direction Régionale de l'Environnement, de l'Aménagement et du Logement (Regional Direction of the Environment, Development, and Housing, DREAL PACA). The DREAL is a regional unit of the Ministry of Ecology, Sustainable Development, Transportation, and Housing (abbreviated as MEDDTL, but also known as the Ministry of the Environment (PARN 2011)). Similarly to the départemental level, the région also has a Préfet de Région who serves as the state representative and the Administration of the Région, as well as the Regional Level Assembly as the main entities involved in administrative decision-making. The MEDDTL also contains the General Directorate of Prevention of Risks (DGPR).

Actors holding a primarily emergency management related function at the regional level are the General Secretariat of the Defense Zone and the Civil Security Zone Headquarters Staff operating within the Zonal Defense Operations Centre. Nongovernmental organizations such as the Red Cross and Caritas also play an important role in emergency management as well as the (primarily volunteer based) Civil Protection. These entities operate at all levels, each having their own headquarters at the national level. The Directorate of Civil Defense and Security (DSC) falls within the Ministry of the Interior, serving as the main emergency management body at the national level and is supported by its Interministerial Operational Crisis Management Centre (CODIG) to provide 24 hour monitoring (EC 2015b). The organization of emergency response is organized from the national level into different zones, each featuring a zonal prefect. These zones each have an Interregional Civil Security Operational Co-ordination Centre (COZ, or zonal operational center for public safety) (EC 2015b). The national level also includes the Compagnies Républicaines de Sécurité (CRS) Montagne, which are specialized members of National Police who collaborate with PGHM and the National Gendarmerie (PARN 2011). The main admin-

istrative decision makers at the national level include the President, the Prime Minister, the Council of Ministers and the Parliament (including the National Assembly and the Senate). A platform for risk reduction was created at the national level in 2001 and is led by the Ministry for Ecology and Sustainable Development (Ministère de l'Écologie, du Développement Durable et de l'Énergie) (UNISDR 2014). The Council Direction for the Prevention of Major Natural Risks (Conseil d'Orientation pour la Prévention des Risques Naturels Majeurs, or COPRNM) functions as an advisory body to the Minister involved in disaster risk reduction matters, and the French Association for the Prevention of Natural Catastrophes (Association Française pour la Prévention des Catastrophes Naturelles, AF-PCN) is a member of this platform working with the Ministry of Sustainable Development (Association Française pour la Prévention des Catastrophes Naturelles 2016).

A number of actors are found at the national level but also operate at the région and départemental levels including: the National Forestry Agency (ONF) which is the overarching state agency from which the RTM is based; the Bureau of Geological and Mineral Research (Bureau des Recherches Géologiques et Minières, or BRGM), a state funded office concerned with the handling of natural resources and geological hazards, and the Rhône-Méditerranée-Corse Water Agency (Agence de l'Eau Rhône-Méditerranée-Corse), concerned with catchment scale protection and management of water resources and spans across four régions (Agence de l'Eau Rhône-Méditerranée-Corse n.d.). With respect to insurance, the CatNat is the system of the Indemnification of Natural Disasters at the national level, providing compensation for victims in the case of a natural disaster which is declared by interministerial decree (PARN 2011). The Central Reinsurance Agency (CCR) is the reinsurance company that covers natural catastrophes in France and works with the Météo France (French Meteorological Survey) for modelling purposes. Météo France is attached to the Ministry of Transport and provides surveillance and forecasting of atmospheric phenomena, with a national center and centers located in each département (PARN 2011).

8.4 Satellite case summaries: Wieprzówka catchment (PL) and Fella catchment (IT)

Although similarly structured to the main case study site sections above, the following case summaries are provided in slightly less depth for the satellite cases. The information provided is for the purpose of understanding basic information and demonstrates the relevance of the satellite case selection and use.

Summary: **Wieprzówka catchment (PL)**

Physical context characteristics

The majority of the information within the following paragraphs with regard to the physical context (including the “Major events” section) is derived from field visit preparatory material created by CHANGES partners Wiktor Głowacki and Janusz Komenda of the Institute of Urban Development, in Krakow, Poland (Głowacki and Komenda 2011a). Other contributors to these materials are cited in accordance with their relevant content. The Wieprzówka catchment lies within the Carpathian Mountains and its foothills but also encompasses part of the Beskid Żywiecki and Beskid Mały mountain groups. The area is made up of flysch formations and features two main rivers, the Wieprzówka in the north and Stryszawka in the south (Głowacki and Komenda 2011a). The terrain experiences landslides and flashfloods; however, the type of flood event varies depending on geographic location, even within the catchment (Głowacki and Komenda 2011b). The Polish Carpathians represented within this case study account for 90 percent of landslides in Poland, while only covering six percent of the entire country.¹³ The landslides themselves are triggered by both meteorological events and seismic activity. In Poland, in general, meteorological events are considered far more influential in overall occurrence of landslide hazards.

Flooding in the area over the last 30 years has influenced the natural landscape. One key example is found in the creation of the Wieprzówka Gorge, which did not exist in the 1970s. Prior to this time, the Wieprzówka River had a wide and shallow riverbed. At this time there were also many problems with flooding in the area (described as both frequent and violent), and structural measures were put in place to attempt to regulate flow. However, a flood in the 1980s destroyed the measures and subsequent floods removed alluvial sediment, narrowing and deepening the river bed over time and revealing dark layers of schist. The gorge was, thus, created and is now a protected site. With regard to flood mitigation, the Świnna Poręba dam and water reservoir is a major, and very current structural measure that provides drinking water resources, recreational functions as an artificial

¹³ Contribution from Teresa Mrozek of the Polish Geological Institute – National research Institute, Carpathian Branch, Krakow.

lake, hydro-electricity, and also functions as a flood protection measure.¹⁴

The catchment features a densely populated area with a total population of 66,708 inhabitants (Głowacki and Komenda 2011b). Three municipalities make up nearly the entire catchment area: Stryżawa (located within Sucha County), Andrychów, and Wieprz (located within Wadowice County).

Major events:

The area has experienced some of its most severe floods in 2005, 2007 and in 2010 in both Wieprz and Andrychów municipalities. In 2001, a landslide occurred in the village of Lachowice in Stryżawa. One of what is commonly referred to as the most serious landslide events in Poland occurred in 2010 in the village of Lanckorona, also within Stryżawa municipality. Some areas of the southwestward facing slopes of the Beskid Mały Mountain (in which the village of Lachowice is located) were settled and developed for many years under the perception that this was not a landslide prone area. In 2001, the area received heavy precipitation at long intervals, measuring as some of the most extreme monthly records, and created a new landslide within the village of Lachowice, causing serious structural damage. The landslide destroyed 12 homes, and endangered 38 others. Recovery required reforestation of nearly the entire affected area and required a cost of 2.5 million polish złoty.

In 2005, a flood occurred along the Wieprzówka River and one of its tributaries (the Frydrychówka) at a point where the two flow close together. The flood expanded from the tributary and flowed into the main Wieprzówka River. Another flood occurred in the same location in 2010, during a time in which severe flooding was widespread throughout all of Poland. The flooding in 2005 also occurred in the municipalities of Wieprz and Andrychów. A presentation from the Municipality of Andrychów (municipal offices), provided a recount of the 2005 event in detail. The following content of these paragraphs are derived from this presentation (see Municipality of Andrychów 6 March 2013).

A state of emergency was declared and central government funding was also made accessible as well as the use of military resources for intervention. Streets were filled with mud and many roads and bridges were eroded, with parts swept away by the flood waters. Debris, including trees and vehicles, also collected along the roads and embankments after the waters receded. Mass movements were also triggered, including gullyng and erosion.

¹⁴ Contribution from Edyta Drożdżał and Agnieszka Piwowarczyk, Regional Water Management Authority – Krakow Branch.

<p>Destruction:</p> <ul style="list-style-type: none"> - Many bridges and roads eroded and swept away - Infrastructure for transportation (consequently) majorly affected - Buildings moved laterally from mass movements <p>Hazards:</p> <ul style="list-style-type: none"> - Flash flooding along the main Wieprzówka River - Mass movements, including landslide and debris flow occurred after the flood <p>Funding:</p> <ul style="list-style-type: none"> - Capacity of local level exceeded, state of emergency declared by central government - Assessment from Voivodeship (regional) offices, and funding support provided <p>Recovery:</p> <ul style="list-style-type: none"> - Military resources used for intervention - Estimated costs for damage (for Andrychów) at approximately 5 million euro - Infrastructure, especially bridges, reconstructed with more resilient design

Figure 8.8: Past major events detail box: Flash flood of 2005 in Andrychów and Wieprz municipalities

The Commission appointed by the Mayor of Andrychów estimated losses to its municipal infrastructure at 29,906,660 polish złoty, although calculations did not include losses to private businesses (e.g. damaged equipment, warehouses, downtime at work). On 8 September 2005, the Voivodeship Commission for verification of the estimate of the damage caused by the natural disasters to municipal infrastructure verified loss estimates at 21,799,050 polish złoty, or approximately 5 million euro (Municipality of Andrychów 6 March 2013). In recovery, bridges were reconstructed according to new parameters to allow greater capacity to survive another such event, for example by construction designed to allow a greater flow of water to pass underneath.

Social context characteristics

Quite similarly to Romania, the administrative structures and regulatory system in Poland are based in a Napoleonic legal administrative family, but also feature characteristics of Communist legal theory (UN 2004). Since the fall of Communism, the county continued prior efforts to decentralize powers to the lower levels of government. This was particularly the case for the delegation of greater powers to municipalities and, although municipalities maintained local autonomy long prior to communist rule, the powers enabled by decentralization and the division of responsibilities at this level were determined in the Act of Local Self-Government of 1990 (UNDP 1999; UN 2004). This decentralization is also found in the Polish constitution, which determines the division of Polish territory into four levels: the state (or national level), the regional (voivodeship) level, the county level (Powiats), and the municipality level (Gminas). Municipalities also encompass smaller villages as the

most local level within their administrative boundaries. Voivodeships, counties and municipalities are all considered part of local self-government. Voivodeships were created at a later time, in 1999 after the Act on Voivodeship Self-Government of 1998, and were determined in tasks and administrative boundaries to complement regional delineations found within the EU.¹⁵ This act explicitly states that the voivodeship level is not to act as a superior administrative body nor can it violate the independence of county and municipality levels. Counties were also introduced in 1999 through the Act on County Self-Government of 1998. Although this level can enact local law, it maintains less legal power than voivodeships and municipalities and is not permitted to “infringe upon the scope of activities of municipalities” (UN 2004, p 8).

¹⁵ Poland joined the EU in May of 2004 (EU 2016).

Emergency management focus	Planning & sectoral management focus	Administrative decision-making focus
Local level (municipalities within Wieprzówka Catchment)		
<ul style="list-style-type: none"> • Municipal Professional Fire Brigade • Volunteer Fire Brigade • Municipal Crisis Management Team* • Municipal Police** • Caritas • Media 	<ul style="list-style-type: none"> • Municipal Planners • Local Water Authorities (Spółka wodna) 	<ul style="list-style-type: none"> • Public/Community Leaders • Mayors (Wójt) • Municipal Technical officers*** • Village Heads • Municipal council (Rada Gminy) • Municipal Board (Zarząd Gminy)
Sub-national level (counties and region)		
Counties (Sucha Beskidzka County and Wadowice County)		
<ul style="list-style-type: none"> • Sucha Beskidzka and Wadowice County Crisis Management Centers • County Fire Department • County Police • Red Cross • Caritas • Media 	<ul style="list-style-type: none"> • Private Planning Firms • Private Insurance Companies 	<ul style="list-style-type: none"> • County Council (and County Council Chair) (Rada Powiatu) • County Board (and County Board Chair) (Zarząd Powiatu)
Region (Małopolska Voivodeship)		
<ul style="list-style-type: none"> • Regional Commandant of the State Fire Service • Regional Crisis Management Center • Red Cross • Caritas • Police • Media 	<ul style="list-style-type: none"> • Environmental Protection Agency • Regional Water Basin Authority (RZGW) • Regional State Planning Offices 	<ul style="list-style-type: none"> • Marshal • Assembly (Sejmik Wojewódzki) • Voivodeship Board (Zarząd Województwa) • Voivode (Wojewoda)
National		
<ul style="list-style-type: none"> • 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 • Red Cross • Caritas • Media 	<ul style="list-style-type: none"> • National Water Basin Authority • Institute of Meteorology and Water Management • Polish Geological Institute (PGI-PIB) 	<ul style="list-style-type: none"> • President • Cabinet (Prime Minister and Council of Ministers) • National Assembly (Upper and Lower Houses)

*A Municipal Crisis Management Team is not legally required

**Does not exist at all municipal levels.

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

Table 8.5: Groups and primary function foci for local and regional level risk management in Wieprzówka catchment, Poland.

According to the Polish constitution, the municipality is considered the primary local government unit and is more influential than counties or voivodeships. At the municipal level (or “local level” with respect to the context in this thesis), there are three types of municipalities: urban, urban/rural, and rural. This level has maintained a relatively high level of independence and has strongly voiced opposition against relinquishing any powers when other sub-national levels, such as county and voivodeship, were created (Kowalczyk 2000). This is in large part the reason for the explicitly stated decentralize powers granted to the local level in the aforementioned acts and constitution (Kowalczyk 2000). With respect to actors in the scope of managing disaster risks, the mayor is the key decision-maker and is (in the case of the local level represented by the presented case study) supported by a municipal crisis management team. Assessments and plans are made by municipal technicians; however, often external firms (consulting firms) such as planning agencies are contracted for such assessments. Crisis management is supported by a local police force and fire department, including both professionals and volunteers. Villages are represented by village heads, acting as a communicative conduit to municipalities but still maintaining the individual identity of the village. There are also local level water authorities who are in charge of maintaining streams and smaller tributaries.

At the county level, in this case Sucha Beskidzka and Wadowice counties, administrative operations are run by the County Council headed by its Chair, and the County Board (and its Chair). At this level, as well as at the regional (voivodeship) level, there are two forms of government: consolidated and non-consolidated. The former includes emergency management actors such as police and fire brigades as well as inspection offices and is supervised by regional and central authorities (COMMIN 2007). The county level is meant to complement the tasks of the municipal level, and to coordinate emergency management efforts in the case of an event that exceeds the capacity or boundaries of a single municipality. Within each county there are County Crisis Management Centers for this purpose. The voivodeship level maintains a similar structure in consolidated and non-consolidated governmental authorities and focuses on territorial self-government as part of its main tasks (COMMIN 2007). It can develop strategies and programs as well as spatial management plans. The non-consolidated, or self-government side, of the voivodeship is made up of a County Assembly and a Marshal (or governor) that is appointed by the assembly (Kowalczyk 2000). The consolidated government lies within the office of the Voivode; the head of which is appointed by the Prime Minister. A number of services and agencies exist at the regional level, including the Environmental Protection Agency, the Regional Water Basin Authority (RZGW), and the Regional State Planning Offices. With respect to emergency management, regional scale efforts are coordinated by the Regional Crisis Management Center and regional police force as well as the Regional Commandant of the State Fire

Service (all of which fall within consolidated government).

The regional level complements the structure found at the local level (e.g. especially with consolidated government bodies) and is reflected in the emergency management structure. The emergency management structure is based on the 2007 Act on Crisis Management, a culmination of several acts created after severe flooding in 1995 and 1997 (Dworzecki 2012). This includes the Act on a State of Natural Disaster on 18 April 2002 and the Act of 21 June 2002 on State of Emergency, as well as the Act of 29 August 2002 on State of Martial Law and on Competences of the Commander-In-Chief of the Armed Forces (Dworzecki 2012). The national level also features agencies operating in planning and sectoral management including the National Water Basin Authority, the Institute of Meteorology and Water Management, and the Polish Geological Institute.

Nongovernmental organizations such as Caritas and the Red Cross are found and operate at all levels, from national headquarters to regional headquarters down to county and municipality representatives.

Summary: Fella River catchment

Physical context characteristics

The Fella River catchment is located in the Italian Alps within the Friuli-Venezia Giulia region near the Austrian and Slovenian borders. The river itself is a tributary of the Tagliamento River and is surrounded by an area featuring steep slopes and commonly high levels of precipitation. In the case of heavy rainfall events, precipitation falls within concentrated areas and causes flash flooding as well as erosion and the triggering of many landslides. According to the key informants interviewed, flooding is considered the most important issue (although the area also experiences many landslides and other mass movements). The area has historically undergone major reforestation projects and contains thousands of small structural measures to stabilize slopes and protect against mass movements.

The area features a unique combination of three different ethnic groups: Italian, German, and Slovenian. Municipalities in this area tend to have quite small populations with Malborghetto-Valbruna at a population of 965, and Pontebba at 1,535 (INS 2011). After the implementation of the Schengen Agreement in 1985, the military presence providing border control left, the main train station ceased to function, and the area started to depopulate. This is obvious even during the field site visits to the town of Pontebba, where one could see many abandoned and dilapidated buildings in what was once a much more thriving border town (as of 2013). Not only in Pontebba, but in the area overall, efforts have been underway to reverse depopulation and to increase tourism and continued devel-

opment. Major investments have since been made in critical infrastructure, especially in roads (this was also apparent and directly observed during the field visit).

Major events:

A severe flash flood occurred on 23 August 2003, affecting the entire Valcanale (the valley in which the catchment area is located). The last flash flood of this magnitude occurred exactly 100 years early in 1903, (past severe flood events also occurred in 1837, 1902, 1983, 1990, and in 1996) (De Marchi et al. 2007). The event was a product of a combination of storm conditions in which 355mm fell in a period of between 3-6 hours as well as very dry soil conditions due to a previous long drought (De Marchi et al. 2007). The event itself, the consequences, and recovery efforts have been extensively documented and studied by researchers of the International Institute of Sociology of Gorizia (ISIG) in cooperation with the local municipal authorities and the regional civil protection. A documentary of the event was created as a result of this research and collaboration and serves as a reminder for maintaining the disaster memory of the severity of this event. The content of this section is based on the work completed by De Marchi and colleagues from the ISIG (see De Marchi et al. 2007).

A warning for the event was given long before but was stated as potentially half the amount of precipitation (150mm) compared to what actually occurred. The main streams flowing into the Fella River (the Malborghetto and the Rio Uque) were uncontrollable, and evacuation was called for most of the affected areas (e.g. including the hamlets of Malborghetto, the hamlets of Ugovizza, and Cucco).¹⁶ Hamlets were severely isolated due to damage along the roads that resulted from numerous landslides. The flood transported sediment, large stones (including boulders), trees and shrubbery and caused “extensive material damage to infrastructures and property and forcing the evacuation of about 600 people” as well as the loss of two lives (De Marchi et al. 2007, p 304). In Ugovizza, the mudflow destroyed two cement bridges, a central square, and a church bell tower with a flow peak height of 4 meters in the streets. There was also an unexpected flow through the center of the hamlet of Malborghetto; and in the case of Cucco, evacuation proved much more difficult due to the isolation of this hamlet.

¹⁶ These are hamlets (smaller administrative units) within the umbrella unit of the municipality of Malborghetto-Valbruna.

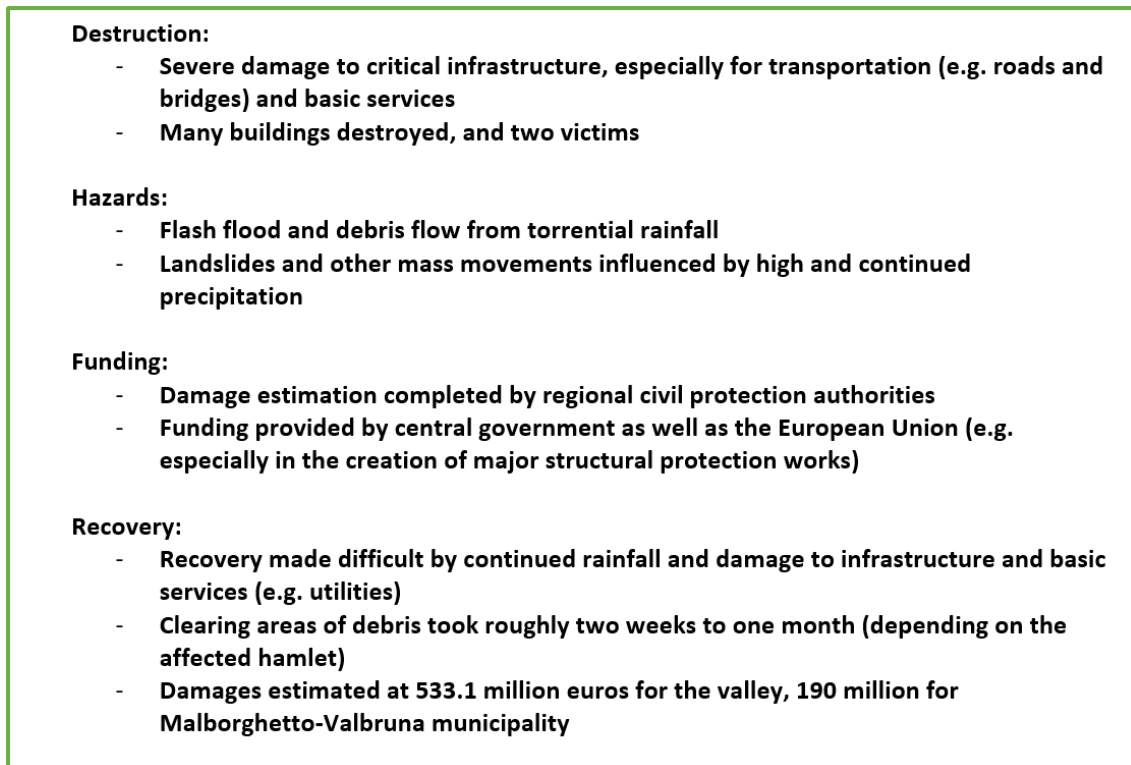


Figure 8.9: Past major events detail box for flash flood of 2003

Although recovery began immediately, it was stymied by continued precipitation several days after the event. It took one month to clear the areas in Ugovizza and Malborghetto, and two weeks for Cucco with volunteers also from Austria and Slovenia (400 volunteers total, including from Italy). Damages to utilities and basic infrastructure created problems for both the population and the rescue services. Damage for the entire valley was estimated at 533.1 million euros, with the municipality of Malborghetto-Valbruna (the hardest hit municipality) with a total damage of 190 million euros. After the event, a bylaw was created that established the “first criteria for the organization of the recovery phase and damage reimbursement” (De Marchi et al. 2007, p 305); an important issue as many criticisms and disagreements arose within the reconstruction process and the allocation of funds throughout the recovery process. Central government funds, as well as funds from the European Union were used to create massive structural mitigation measures after the event.

Social context characteristics

The administrative structure in the Italian case is comprised of municipalities and towns (which include smaller administrative units such as villages and hamlets), provinces, regions, and then the national level. Provinces are sub-divisions of regions and do not maintain any legislative powers. The Fella River catchment is located within Friuli-Venezia-

Giulia (FVG) region, which is one of Italy's five autonomous regions and maintains special status in terms of developing legislation (e.g. for land management and risk reduction), administration, and partial financial autonomy, which in the case of FVG is the retaining of 60% of all levied taxes (Gaetani et al. 2008; EC 2015). This particular region also has its own civil protection headquarters. The catchment area houses a number of municipalities and towns including the town of Pontebba and the municipality of Malborghetto-Valbruna.

Emergency management focus	Planning & sectoral management focus	Administrative decision-making focus
Local level (municipalities in the Fella River Catchment)		
<ul style="list-style-type: none"> • Municipal Fire Brigade • Local Civil Protection • Municipal Volunteer Fire Brigade • Local Civil Protection Volunteers • Municipal Operative Rooms • Municipal Police • Local Carabinieri • Media 	<ul style="list-style-type: none"> • Municipal Planners 	<ul style="list-style-type: none"> • Public/Community Leaders • Mayors • Municipal Technical Officers* • Municipal Council
Sub-national levels (province and region)		
Province (Province of Udine)		
<ul style="list-style-type: none"> • Udine Provincial Fire Department • Udine Provincial Police Department • Carabinieri • Red Cross • Caritas • Media 	<ul style="list-style-type: none"> • Scientists/Academia • Architects (spatial planners) & Private Planning Firms 	<ul style="list-style-type: none"> • President of the Province • Prefect of the Province • Provincial Council
Region (Friuli-Venezia-Giulia Region)		
<ul style="list-style-type: none"> • Regional Civil Protection Headquarters • Councilor of Civil Protection • Regional Operative Room (SOR) • Red Cross • Caritas • Police • Carabinieri • Media 	<ul style="list-style-type: none"> • Environmental Protection Agency (ARPA FVG) • Regional Soil Defense • Territorial Planning Services • Forestry Services • Geological Survey • Water Basin Authority of the Isonzo, Tagliamento, Livenza, Piave, and Brenta-Bacchiglione (ADBVE) 	<ul style="list-style-type: none"> • Regional Administrative Authorities • President of the Region • Regional Council
National		
<ul style="list-style-type: none"> • 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 Alpine Rescue Corps • Caritas • Media 	<ul style="list-style-type: none"> • National Research Institute (CNR) • Agency for Environmental Protection and Technical Services (APAT) • State Forest Corps 	<ul style="list-style-type: none"> • President • Cabinet (Prime Minister and Council of Ministers) • Bicameral Parliament (Chamber of Deputies and Senate of the Republic) • Presidency of the Council of Ministers

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

Table 8.6: Groups and primary function foci for local and regional level risk management in Fella basin, Italy.

At the local level, there is an extensive organization of volunteer services, with volunteers and professionals for both civil protection and fire brigades. There is also the Carabinieri, which are an armed national guard and military police (similar to the case of the Gen-

darmerie in the French case study). Municipal planners, or technicians within the municipality who work on territorial management, liaise with external planning and consulting firms to acquire assessments for individual projects and plans. Municipalities also work with research institutions, such as the University of Trieste in the case of flow modelling assessments conducted after the major event in 2003. Within the administrative focus, the mayor (as is the case in the other four sites) is the primary decision maker in considering and implementing actions such as protection measures and is supported by the municipal council and municipal technical officers (EC 2015).

Several sectoral and emergency management focused entities exist at the “regional” or sub-national levels (the province and region). There are both police and fire department headquarters at the provincial level; however, heads of sectoral departments and entities including the main headquarters for civil protection are located at the regional (FVG) level. Scientific institutions as well as private planning offices (and private architects) are not restricted to a particular level and occur within both provincial and regional levels, contributing information for risk assessment depending upon the contracted request. The most influential actor at the regional level is arguably the Regional Civil Protection, who tend to have substantial funding and decision-making powers in determining what measures and actions are implemented even at the local level. Other key actors include: the Environmental Protection Agency (ARPA FVG), which evaluates consequences of events on the environment at the regional level and conducts environmental assessments of mitigation measures that will be put in place; the Regional Soil Defense, which produces flood hazard maps such as the PAI (the Piano stralcio di assetto idrogeologico), works also in debris flows and coordinates with the Geologic Service for this using also historic data for creating these maps; the Geological Survey; the Territorial Planning Services; the Forestry Services, who also plan and implement structural measures using natural materials; and the Water Basin Authority of the Isonzo, Tagliamento, Livenza, Piave, and Brenta-Bacchiglione (AD-BVE), which manages and plans for flood hazards as well as water quality within its basins.

The national level houses emergency structures including the Civil Protection Department which includes: the National Commission “Great Risks”, the National Commission for Prediction and Prevention of Major Risks, and the Operative Committee (Operative organizations include Fire Brigade, Armed Forces, Police Forces, and Italian Red Cross). The National System of Civil Protection was established in 1992 with the Law of 24 February 1992, N.225 Establishment of the National Service for Civil Protection. Civil protection in general was previously managed by the Fire Brigade National Corps, under the Ministry of Internal Affairs but was given its own ministry in 1985 (the Ministry for Civil Protection) (Gaetani et al. 2008). The Operations Committee coordinates intervention activities for rescue operations at both national and at local levels (EC 2015). The Civil Protection

Department falls under the Presidency of the Council of Ministers and is also connected to the State Forest Corps (through the Ministry of Agricultural Policy and Forestry) and the Agency for Environmental Protection and Technical Services (APAT) (through the Ministry of the Environment) (Gaetani et al. 2008). The National Research Institute (CNR), conducts a wide range of studies for risk and hazard assessment and collaborates with government agencies.

8.5 Conclusion

The information provided within this chapter should assist the reader in having the basic necessary background knowledge as to some of the physical and social context characteristics in both the main and satellite case studies. The above information also demonstrates the similar physical characteristics of the hazards, potential risks, and past consequences these cases have faced. One should note the similarities in some of the mechanisms driving risk within these cases: namely, a physical predisposition to extreme events (particularly flash flooding and mass movements triggered by certain precipitation thresholds); in most cases, historically relevant human activities such as deforestation that have encouraged the already unstable terrain; and the continued development of the settlement structures within these catchments. The chapter also provides basic background information as to the key actors at local, regional, and national levels and the general focus of their responsibilities within the governance of risks.

Chapter 9

Introduction to results for understanding “good” risk governance within different contexts

This chapter provides an introduction to the rest of the results chapters, with Chapter 10 targeting the Romanian case study results, Chapter 11 focusing on the French case study results, and Chapter 12 providing the multi-case comparison, integrating and reflecting upon both the main cases and the satellite case study inputs from the Italian and Polish cases. The sections within this chapter provide first the purpose of the traffic light system and the results content and then an explanation of the traffic light analysis process and aggregation of information as well as the presentation of results. An explanation is also given for mapping the connections between categories for the main case study sites and also a brief explanation of the inputs from the satellite cases.

9.1 Purpose of traffic light system and results content

Within the next several results chapters (Chapters 10, 11, and 12), presenting results for different contexts and their comparison targets the primarily exploratory part of the research. With respect to the research objectives, the chapters address objectives two and three. In addressing **Objective 2** *Establishment of what is the spatial context in which risk governance processes occur within each case study area through both desk study research and fieldwork*, the chapters provide the evidence base for the spatial context through the lens of the understanding of “good” risk governance presented in this research, specifically via the category and indicator system. **Objective 3** *Operationalization of risk governance through use of an indicator system to establish the basis of analyzing the empirical work in each study area* is supported through the use of the category system as a tool to operationalize

risk governance with an in-practice evidence base.

The content presented in Chapters 10 and 11 addresses the main research question **RQ1** *Do strategies and practices therein reflect “good” risk governance principles?* The operationalization of “good” risk governance is presented within these chapters using primary data. This helps address the main question in terms of identifying connection to “good” risk governance within the case studies and is then later addressed in Chapter 12 with the comparison of these cases and additional support from the satellite cases. Chapter 12 takes what is presented in Chapters 10 and 11 and enables development of the answer to part (a) of the main question; targeting a comparison across different cases of the “good” risk governance system in terms of what is “good” (**RQ1.a**). Part (b) in terms of what are considered as “good” practice examples (**RQ1.b**) is addressed in the final chapter of this thesis. Chapters 10 and 11 focus on the individual cases, the presentation of the results from these cases, and how the operationalization of the tool used in these cases can communicate the results. The chapter to some extent also addresses **RQ4** *Are there important cultural factors which influence risk decision-making processes (e.g. aspects of political or organizational culture)?* This is achieved through the specific category **Risk Culture** and the evidence base that is provided from the primary fieldwork presented in these chapters. **RQ2** *Do the key actors and the distribution of their roles and responsibilities differ among the study sites?* and **RQ3** *Do the most relevant regulations (both formal and informal) which make up the policy framework for disaster risk management dramatically differ?* are more indirectly addressed as the content in these chapters provides information into the existence of different perspectives and issues among the various actors and about the regulatory frameworks they are a part of and work within. The insight and further consideration of these aspects of the research are elaborated within Chapters 14 providing reflections and observations and Chapter 15, which provides recommendations and conclusions as well as avenues for further research.

With respect to the purpose of the present chapter, one must also reiterate why the particular analysis methods discussed in this chapter were selected to address the RQs and Objectives. The methodological understanding that supports this approach (and was previously addressed in Chapter 2) is echoed in the following quote from Squires et al. (2014):

...sharing [of] approaches, strategies, and experiences... [t]elling the stories of both successes and failed efforts can provide a rich source of data with which to generate new solutions” and, furthermore, “...provide an opportunity to acknowledge both the qualities that make particular places and efforts unique as well as the elements that might be generalized across contexts (Squires et al. 2014, pp 372-373).

This reflects the methodological approach in that it encourages the sharing and potential interpretation and generating of solutions across these experiences, and connects directly to the aim of the research with respect to acknowledging qualities of place that are unique as well as potentially in common. Given that the interviewees are key informants and that importance is placed on their perception and shared experience, the quality of the research pursuit is not dependent upon achieving a specific n-value sample size. In contrast, it is more important to have representation of targeted stakeholder groups. It is also important to state that not all informants have to agree on a particular issue. Disagreement can demonstrate the complexity of understanding how on-the-ground stakeholders think practices “should” be managed and what is considered “good” practice. This stance is supported through Roe (1994) who states that although information is provided, it:

...may ultimately represent incommensurable values... [I]ncommensurability does not mean the positions are therefore incomparable. They can be compared and contrasted, at least for the purposes of generating another narrative altogether, one that could be more helpful than any of the positions on their own, but one that in no way slights their incommensurability (Roe 1994, p 19).

The statement above communicates an essential connection to the content both provided in Chapters 10 through 12, as well as Chapter 13, which features the comparative analysis. It fits well to the development of a comparative tool (such as that developed by this research) that enables a compare and contrast process for data with highly qualitative (almost seemingly immeasurable) character and the formulation of narrative summaries for case study contexts. There are alternative methods to the data analysis that had been considered but were ultimately not used, particularly for the aggregation of the presented data, as these methods did not reflect the purpose of the research pursuit (a pragmatic and exploratory approach toward understanding), and did not enable an appropriate representation of the data. Quantitative methods fall within this range of alternative methods. Though there is some form of measurement in the traffic light system employed in analyzing the data, this indicates more or less the direction of the sentiment from the key informants but does not attempt to assign a specific numeric weight. Another alternative to the selected methods is a “key words and phrases search” that can be conducted in analyzing the transcripts (Saldaña 2013). This, although considered, was not chosen. The method would indeed take less time than the full contextual analysis pursued in connecting interview content to the definition of different “good” risk governance categories. However, there is substantial risk in using a word search based analysis in that the researcher can lose important meaning within context – a potential travesty when considering the purpose of the research is to try to enhance understanding through analysis of key informant perspective and input from on-the-ground practice. Other qualitative methods were considered including the oft cited “thick” descriptions from Clifford Geertz (readers are encouraged to see Geertz

(1973), “The Interpretation of Cultures: Selected Essays” for reference). However, the time intensity of elaborating thick descriptions of the stories and general content provided by the key informants in the different cases is combined with the complication of attempting to eventually compare these descriptions and required the development and achievement of a “middle ground”.

This middle ground was found in the structure and use of the analysis tool (i.e. category and indicator system) which enabled combining highly qualitative information within a more comparative format, while attempting to not lose quality of context. The approach is much closer to a thematic analysis and meta-narrative direction; both of which are useful methods in qualitative data analysis and used in policy research. In the explanations of the methods employed and aggregation of data collected in the section that follows, attention is paid to communicating how this middle ground maintains a transparent research quality and verified method, but still attempts to convey perceptions as they are.

9.2 Traffic light analysis process, aggregation, and presentation

As mentioned in Chapter 6, the transcripts were analyzed in a similar fashion to the EU policy documents using MAXQDA software and the “good” risk governance category system (see Chapter 6 for visual of coding process and brief explanation). The coded segments from the analysis in MAXQDA were exported into tables. The tables were structured according to the indicator categories; meaning all segments of category 1 Openness & Transparency are listed first, followed by all the segments coded by category 2 Accountability, and so on (please see visual of table in Figure 9.1). Due to the extremely large nature of these tables, they have been moved to the annex content. Annexes 15-18 contain these tables for each case and provide a transparent accounting of how the interview material was analyzed. The explanation of the traffic light assignment and the informational use of each coded segment provided in the following paragraphs for the contents of these annexes applies to the main case study sites (the Nehoiu and Barcelonnette catchments). The evidence for the satellite cases (the Fella and Wieprzówka catchments) underwent the same MAXQDA process and output but were not analyzed to the same depth as the main cases. This is why, for example, when viewing Annexes 17-18, one can see that the traffic light and further text analysis statement is not provided for the satellite cases (although the output of evidence ascribed to each category is still presented). In all cases, each segment is accompanied by the name of the transcript document from which they came (e.g. Transcript R-11_X_Environmental Protection Agency).

Document	Code	Begin	End	Segment	Traffic light output (Y/N/R)	Informational use (I)	any overlaps or connections to other categories?
1 Transcript F-10_X - DDT 04_28_06_2013	Indicator Category 1: Openness & Transparency	99	101	Tess: No, no, PPR maybe b PPR?) Coded text segment in all areas is the y useful to have a	Y	For the PPR, one must discuss with the population, especially because you have to prove to value of people (th them from	
2 Transcript F-10_X - DDT 04_28_06_2013	Indicator Category 1: Openness & Transparency	115	119	Tess: J'ai une petite question pour la réunion avec le publique, la consultation: Est-ce qu'il y a un exemple quand il ne marche pas bien?) Lecordix: Aujourd'hui? Non. (Tess: Non, ok.) Lecordix: Il y a 50 ans. Mais maintenant on fait mieux et donc ça se passe mieux. Tess: Ah, ok. Paragraph reference	Y/G	Consultation is very important" F-10, P99-101 even if all planning risk culture generally consultation (for the PPR) works well (currently no problem) and has improved also from 50 years 50 ye 119)	Connections/overlaps
3 Transcript F-10_X - DDT 04_28_06_2013	Indicator Category 1: Openness & Transparency	654	678	Tess: Ok, I have a question, kind of a general question: What would you say is your long-term strategy for your work? What would you, quel est l'objectif... Lecordix: à la long-terme.) Lecordix: Aujourd'hui notre objectif principale c'est de former la population. Laurine: Their main objective is to teach the population. Lecordix: Et en priorité les enfants. Laurine: And especially the children. Lecordix: Parce-que que les enfants sont des adults de demain. Et parce-que les enfants sont aussi les formateurs de leurs parents. Laurine: And because children teach their parents. Lecordix: Donc on a mis en place un programme pédagogique sur les risques à destination des écoles du département. Indicator category	Y/G	Nice example of informing the population as a key priority, especially children because it is that the each the parents. a 3D space le earth that they've created so that children can see the risks, place items in the landscape like houses, villages, roads, etc. and see where there is risk e.g.	Analysis of text segment Traffic light evaluation

Figure 9.1: Example of interview analysis table from French case study.

In order to maintain a degree of anonymity, the annexes containing the interview analysis have been edited so that the names of the interviewees have been removed and their affiliation and transcript number identifiers remain. This can be seen with the replacement of the name by use of the letter X. This replacement is used in cases in which the full name of the interviewee appears. Cases in which the partial name, or only the first name, appear have not been edited. This is why, for example, in the segment columns one can see the first name of the interviewees in some of the text. However, all full names have been removed. The transcript name is located within the “Document” column, and is followed by the particular category addressed in the “Code” column. The next three columns provide the specific text segment and reference to the text segment that has been ascribed to the code.

For referencing and providing transparency as to where the text segment comes from, the beginning and end paragraph in which the statement occurs is provided in the “Begin” and “End” columns following the indicator category (“Code”) column. For the main cases, these paragraphs are also indicated in the analysis of the text segment (“Informational use” column) with the letter “P”, followed by their corresponding numbers and range. This letter “P” is automatically generated within MAXQDA for each return space indicated in the transcript documents. Providing the corresponding “P” numbers enables a clearer reference point and greater transparency for where another researcher can find the exact text in the transcript. For example, a reference such as “F-5, P23-25” would indicate the fifth transcript from the French case study, paragraph numbers 23-25.

It is important to reiterate that each segment is analyzed and described to a particular category (this has been done as aforementioned using qualitative analysis software, MAXQDA). Connecting a statement to the category is done with the definition of the category and its respective indicators acting as a filter through which the context of the transcripts is viewed. The definitions and indicators for each category, therefore, support the researcher in connecting the interview text and interpreting them as evidence for that category. They, furthermore, provide the basic understanding for how one would interpret the category, forming the basis of the decision to connect the segment text. Preceding the “Informational use” column is the traffic light output, indicated by Y, G, or R. A brief analysis statement is provided for each text segment supporting and explaining the interpretation of the interview content as either information for a positive (“G” for green), a neutral (“Y” for yellow), or a negative (“R” for red) perception of practice. An elaboration of the G/Y/R or “traffic light” interpretation is provided in Table 9.1.

Traffic Light	Description
Red (R)	<ul style="list-style-type: none"> • Not existing; this is a problem area
Yellow (Y)	<ul style="list-style-type: none"> • Existing to some extent or in the beginning stages of development • Past initial stages of development, established and beginning to implement • Implemented
Green (G)	<ul style="list-style-type: none"> • Highly effective and provides a good or best practice example of practice implementation

Table 9.1: Elaboration of meaning behind the G/Y/R or "traffic light" interpretation of practice.

In some cases, no analysis statement is given. This reflects the interpretation that the coded segment is, in some cases, a repeat of information, or information that might be descriptive in nature but does not provide evidence toward an indication of G, Y or R. These cases are noted by an ellipse (e.g. "...") in lieu of a traffic light value. In the process of assigning the traffic light values to the text segment, there were also cases in which a combination of traffic light designations were appropriate (e.g. both a good example and a bad example could be present depending upon the information provided). The key in assigning traffic light designations was to ensure that the information provided was represented as transparently as possible; for example, in the case that a negative situation was described (R), the “silver lining” of that situation would still be represented as something positive (either as Y or G depending on whether “in-progress” or “good practice” was discussed).

The analysis of the text and the traffic light designations indicating the direction of the analysis were aggregated into a descriptive summary and table for each category in Chap-

ters 10 and 11 (twelve categories, with five indicators each) for both of the main cases. To conduct this aggregation, the analysis of each of the coded text segments was assigned to the indicator to which it most closely fit, providing an evidence base from which to draw conclusions as to whether there are examples of Y, R, or G for each of the indicators. Transcript references are given for each of the green, red, and yellow statements representing the traffic light outcome. This is done to ensure that the reader has a reference point for where this information comes from. An overall summary table is provided in the beginning of each of the main case study chapters. This is based on the traffic light evidence, and summaries for each category presented in the chapter and provides a short reference and brief overview for the case results. As a way of communicating the process of analysis and content provided in Chapters 10 through 13, a list of bullet points describing this process is provided below:

1. **Transcription:** all interviews transcribed from audio to text
2. **Category coding:** all transcripts analyzed by searching for and coding content connected to the “good” risk governance categories (drag and drop to code in MAXQDA software)
3. **“Traffic light” filter & text segment analysis:** for the main cases, for each coded segment, using a “traffic light” measurement, determination made of whether content provides evidence of a positive, neutral, or negative perception of practice
4. **“Traffic light” summaries:** traffic light designations and segment analysis summarized for each indicator and overall summaries provided for each category within both main cases
5. **Connection mapping:** connections between categories mapped for both of the main case studies
6. **Integration of satellite case support:** additional, supporting input from the two satellite cases summarized, matching and contrasting key issues found in main cases
7. **Reflection on connections:** pulling key points from main case connection mapping, connections explained amongst “good” risk governance categories and reflect on the tool itself

The explanation for numbers five, six, seven are provided in the following sections. Number seven draws from the content of the analysis in Chapters 10 and 11 and is supported in part from examples in the comparative analysis presented in Chapter 12.

9.3 Connection mapping for main cases

Another important component elaborated within the individual main case study chapters is the “connection mapping” conducted to elaborate where connections were revealed

amongst the category and indicator system. This was conducted by first physically mapping the evidence base for each of the categories for both of the main cases. Connections were literally drawn between the content of one indicator in one category to the indicator of another category. These connections were then digitalized, examples from this process for both the French and Romanian cases are shown in the figures below.

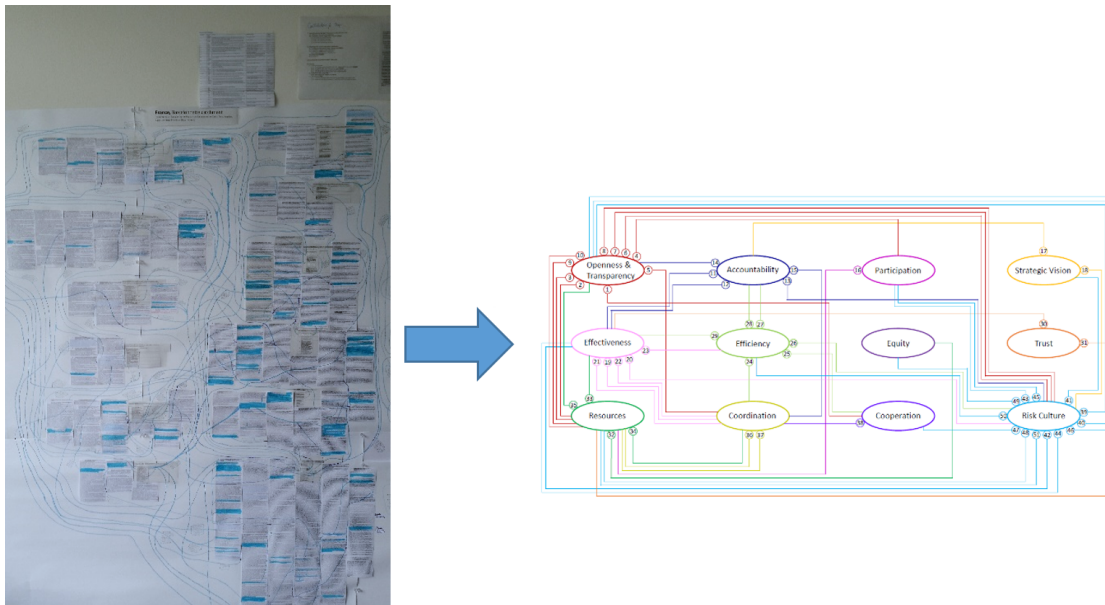


Figure 9.2: Physically mapping to digitalization example from French case study.

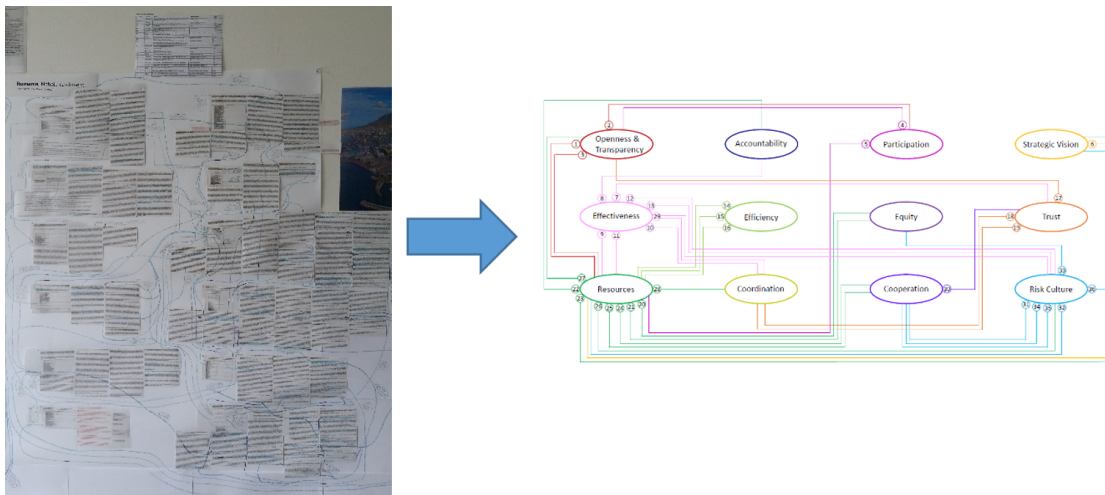


Figure 9.3: Physically mapping to digitalization example from Romanian case study.

The digitalized versions are provided in larger and clearer quality in Chapters 10 and 11. Each major ellipse in the digital versions represents one of the 12 categories. Lines are drawn from one category to another, with a numbered bubble representing from where the

connection originates. Each of the numbers represents a brief explanation that is provided for that connection. These explanations are provided in Chapters 10 and 11 with their numeric reference. The presence or lack thereof of numbered bubbles around the category provides a visual as to how connected that category is within each case to other aspects and principles of good risk governance within the evidence base provided by the case study sites. The colors of the ellipses have no particular relevance aside from differentiating between the different categories. The colors of the lines are also determined based on where the connection originates.

This assists in identifying potentially necessary meaning that is missing in the understanding of the system itself and provides information toward improving or adjusting the analysis tool. The diagrams and explanations provided within this part of the process help the reader to visualize what the key categories within the cases are, how they are connected, and how these potential connections differ. This, furthermore, assists in understanding how improvements in the analysis tool can better reflect in-practice issues. The knowledge gained with this understanding in addition to the latter two parts of the process (satellite case summaries and concluding narrative) can also enable insight into how to adjust and make improvements in the EU policy that supports this tool.

9.4 Brief explanation of satellite case inputs

The satellite cases provide additional information from the two other cases investigated within the CHANGES project. Although the in-depth analysis employed for the two main cases is not pursued with the satellite cases, these latter two cases enable an important input and support into furthering the insight gathered from the two main cases. In analyzing the data from these cases, attention was paid to key points of interest and issues which appear to be in common or in great contrast to the main cases.

9.5 Reflection on connections

The last part of the process, the “reflections” provided in Chapter 13, draws from the key points provided from the main and (to a lesser extent) the satellite cases. The chapter connects back to the understanding of “good” risk governance as developed through the analysis tool for this thesis and reflects on how in-practice examples explain connections between “good” risk governance principles (through the category connections). Additional reflections are also provided in connection to the spatial dimension as a core component of the research as well as on the chosen research approach.

Chapter 10

Main case results: Nehoiu catchment (Romania)

10.1 Results summary

The broad analysis statement is based off of all the information provided in the traffic light output for each category. The evidence base provides the transcripts that were used in formulating the broad analysis statement. The traffic light colors are kept to indicate where positive examples can be found, as well as issues in progress, and problem areas. This helps communicate to the reader which key informants provided support for the analysis statement. In the case that there are repeats within the same color (for example multiple positive supporting statements from transcript R-2), the transcript is only listed once.

A few initial key notes can be made in highlighting some of the main points from the Nehoiu case and the presented results and evidence base. Within this case study one of the main problems appears to be an overall lack of resources. This includes financial, personnel, training, information, and technology. This dramatically limits the disaster risk management capacity at the local as well as the county level. Corruption still appears to be a serious issue affecting the quality of risk assessment practice and use of risk-related information. Establishing good communication appears to be an important mechanism in fostering and maintaining trust between the public and authorities as well as amongst the different authorities themselves. Good communication, furthermore, appears to be the prerequisite for building trust.

The availability of information is also a serious issue in which some risk and hazard related information is either non-existent, not available, or is otherwise known to be secret. There are also difficulties in encouraging public participation. Participation activities are considered to be much lower priority than ensuring adequate income to sustain a house-

hold. Additionally of important note is that spatial distribution (where peoples' homes are physically located) is held as the most important factor influencing the difference in vulnerability from one household to another. This is related to the issue that in some places people will build their homes on land that is less expensive, but exposed to risks. The local authorities would rather that people have a place to live on land exposed to risk, than for these people to not have a place to live at all. Authorities, especially at the local level, wish to implement visible measures (e.g. structural measures) rather than non-structural measures or plans as they feel this will show progress and improvement from the plans and inaction experienced during the Communist era. These points and many others are elaborated in the following Table 10.1, and the sections in 10.2 Presentation of "good" risk governance results by category and 10.3 Connection mapping and explanation.

Table 10.1: Summary of results by category for Nechoiu catchment (RO) case study

Category	Broad Analysis Statement	Evidence Base
<i>Openness & Transparency</i>	Improvements in flood risk and hazard information at the county level as well as for dissemination of this information, although information at the scale of the local catchment level is not available. Some information also considered secret and therefore not available. Dissemination limited by resources. Disagreement on whether the public has enough information, depending on type of key informant (public authorities find information adequate, private sector and scientific researchers inadequate). Good examples with informative websites, however issues for those without access to Internet. Discussion of expanding SMS alerts.	Transcript R-2 BLOM private planning and consulting, Preliminary fieldwork meetings (ISU Buzău, Environmental Protection Agency), Transcript R-22 Architect (SC Proiect Buzău Private Planning Firm), R-23 County Council Chief Architect, Preliminary fieldwork meeting with ISU Buzău, R-8 Buzău County Sub-Prefect, R-14 Town of Nechoiu Vice Mayor, R-17 Environmental Inspector and Village Representative, R-18 Head of Nechoiu Emergency Volunteers, Transcript R-3 Geologist (Geological Institute of Romania), R-21 Nechoiu Shop Owner, R-26 Representative (EPC Private Environmental Consultancy), R-27 Geomorphologist (IGRAC), R-11 Chief of Service, (Environmental Protection Agency), Preliminary fieldwork meeting with ISU Buzău
<i>Accountability</i>	Regulatory guidelines stated as clear and good. Exception with legal framework for landslide risk management. Differentiation of responsibilities amongst authorities and local level clear (no conflicting overlaps). Similar for county level, though some exceptions (some conflicts between local and county level entities). Some checks and balances in keeping actors accountable to their responsibilities. Issue, however, with disincentive to enforce fines at local level. Some monitoring for forestry and terrain, but general activities rough and very limited. Maintenance of mitigation measures faces a number of issues, including need for greater thought in construction parameters and adherence to parameters.	Transcript R-11 Chief of Service, (Environmental Protection Agency), R-12 Head of Forestry & Administrator (Private Forestry Office Nechoiu), R-23 County Council Chief Architect, R-27 Geomorphologist (IGRAC), R-18 Head of Nechoiu Emergency Volunteers, R-20 Nechoiu Police Officer, Transcript R-22 Architect (SC Proiect Buzău Private Planning Firm), R-23 County Council Chief Architect, Preliminary fieldwork meeting with ISU Buzău, R-8 Buzău County Sub-Prefect, R-14 Town of Nechoiu Vice Mayor, R-17 Environmental Inspector and Village Representative, R-18 Head of Nechoiu Emergency Volunteers, Transcript R-3 Geologist (Geological Institute of Romania), R-21 Nechoiu Shop Owner, R-26 Representative (EPC Private Environmental Consultancy), R-27 Geomorphologist (IGRAC), R-11 Chief of Service, (Environmental Protection Agency), Preliminary fieldwork meeting with ISU Buzău
<i>Participation</i>	Involvement relatively low in both prevention and response activities. For two-way communication, some good examples found with new local leadership and village representation system. No evidence of ownership or co-ownership in decision-making. More public education needed, although some current efforts exist from variety of county level authorities, especially with children. Very strong reliance found with integration of local knowledge for decision-making (at both local and county levels). Insufficient evidence to derive key points or patterns for the feedback systems.	Transcript R-16 Head of Nechoiu Library, R-19 Nechoiu Urban Planner, R-17 Environmental Inspector and Village Representative, R-10 Head of Service (County Prefect's Office), R-23 County Council Chief Architect, Transcript R-2 BLOM private planning and consulting, R-26 Representative (EPC Private Environmental Consultancy), R-9 Director (Red Cross Buzău), R-11 Chief of Service, (Environmental Protection Agency), R-18 Head of Nechoiu Emergency Volunteers, R-27 Geomorphologist (IGRAC), Transcript R-11 Chief of Service, (Environmental Protection Agency), R-14 Town of Nechoiu Vice Mayor, R-22 Architect (SC Proiect Buzău Private Planning Firm), R-23 County Council Chief Architect, R-24 County Cadastral Office, R-25 Deputy Director (ISU Buzău), R-27 Geomorphologist (IGRAC)

Table 10.1: (continued)

Category	Broad Analysis Statement	Evidence Base
<i>Strategic Vision</i>	Difficulty in finding substantial evidence beyond reiterated point that it is difficult for the key informants and for stakeholders in general to have a strategic vision. The reasons for this primarily based on limited resources and the consequential inability to plan for the long term.	<p>Transcript R-12 Head of Forestry & Administrator (Private Forestry Office Nehoiu)</p> <p>Transcript R-14 Town of Nehoiu Vice Mayor, R-17 Environmental Inspector and Village Representative, R-18 Head of Nehoiu Emergency Volunteers, R-23 County Council Chief Architect (Additionally: general observation from researcher from preliminary and primary fieldwork) R-11 Chief of Service, (Environmental Protection Agency), R-22 Architect (SC Proiect Buzău Private Planning Firm), (Additionally: Personal Communication, Dr. Mihai Micu, 16.02.2016) and Nehoiu sustainable development strategy) (Additionally: updated website of the town of Nehoiu, see www.primaria-nehoiu.ro/?s=Strategia+de+dezvoltare+durabila+a+orasului+Nehoiu&submit.x=0&submit.y=0 last accessed 29.07.2016), Transcript R-14 Town of Nehoiu Vice Mayor, R-17 Environmental Inspector and Village Representative, R-18 Head of Nehoiu Emergency Volunteers, R-23 County Council Chief Architect (Additionally: general observation from researcher from preliminary and primary fieldwork) Town of Nehoiu Vice Mayor, (Additionally: general observation from researcher from preliminary and primary fieldwork), R-9 Director (Red Cross Buzău), R-10 Head of Service (County Prefect's Office), R-12 Head of Forestry & Administrator (Private Forestry Office Nehoiu), R-25 Deputy Director (ISU Buzău), R-26 Representative (EPC Private Environmental Consultancy), R-27 Geomorphologist (IGRAC)</p>
<i>Effectiveness</i>	Little evidence was gathered for ability of past experiences to enhance achievement of overall goals. Little evidence for the effectiveness of early warning systems (EWS). Issues arose for preparedness, including lack of education and training, as well as corruption. Flexibility appeared to be a more easily addressed topic than redundancy (though with some variations as to what is considered too strict vs. adequately flexible); while biggest issue of all is lack of adherence to legal requirements.	<p>Transcript R-14 Nehoiu Vice-Mayor, R-17 Environmental Inspector and Village Representative, R-25 Deputy Director (ISU Buzău), R-16 Head of Nehoiu Library, Transcript R-11 Environmental Protection Agency Representative, R-18 Head of Nehoiu Emergency Volunteers, R-17 Environmental Inspector and Village Representative, R-3 Geologist (Geological Institute of Romania), R-2 BLOM private planning and consulting, R-23 County Council Chief Architect, R-26 Representative (EPC Private Environmental Consultancy), R-9 Director (Red Cross Buzău), R-10 Head of Service (County Prefect's Office), R-16 Head of Nehoiu Library, R-24 County Cadastral Office, R-22 Architect (SC Proiect Buzău Private Planning Firm)</p>

Table 10.1: (continued)

Category	Broad Analysis Statement	Evidence Base
<i>Efficiency</i>	Little evidence amassed; however, in general appears to be very difficult to get to the topic of efficiency without first discussing lack of resources. Some conclusions drawn with: actions taken at most appropriate level (issue of inaction at local level), efforts to limit “red tape” for emergency management, some issues of (lack of) best practice implementation (e.g. for public infrastructure), and some positive perception that timeframe for actions carried out is positive.	Transcript R-16 Head of Nehoiu Library, R-14 Town of Nehoiu Vice Mayor, R-8 Buzău County Sub-Prefect, R-27 Geomorphologist (IGRAC), (Additionally: general observation from researcher from preliminary and primary fieldwork), Transcript R-27 Geomorphologist (IGRAC), R-25 Deputy Director (ISU Buzău), R-17 Environmental Inspector and Village Representative, R-9 Director (Red Cross Buzău), R-3 Geologist (Geological Institute of Romania), R-18 Head of Nehoiu Emergency Volunteers
<i>Equity</i>	Issues with inability to reach isolated areas. Some (limited) evidence of partiality in decision making and actions. Examples in issues of favoritism but also improvements. Good example for social welfare programs (with some caveats). Importance of the physical (or territorial) part of spatial context and how this contributes to vulnerability of local populations, relative to other factors.	Transcript R-20 Nehoiu Police Officer, Transcript R-17 Environmental Inspector and Village Representative, R-16 Head of Nehoiu Library, R-14 Town of Nehoiu Vice Mayor, Transcript R-13 Insurance agent (ASTRA Insurance Local Branch), R-3 Geologist (Geological Institute of Romania), R-14 Town of Nehoiu Vice Mayor, R-16 Head of Nehoiu Library, R-25 Deputy Director (ISU Buzău), R-20 Nehoiu Police Officer, R-8 Buzău County Sub-Prefect, R-18 Head of Nehoiu Emergency Volunteers, R-19 Nehoiu Urban Planner, R-17 Environmental Inspector and Village Representative, R-26 Representative (EPC Private Environmental Consultancy), R-25 Deputy Director (ISU Buzău), R-16 Head of Nehoiu Library, R-3 Geologist (Geological Institute of Romania)
<i>Trust</i>	Generally a good level of trust between local authorities and public. Specific good examples of trust amongst selected county level authorities. Good perception of trust amongst same horizontal level. Trust improving amongst all (up to national) levels. However, serious issues with corruption in assessment and cronyism. Issues also between local and county level authorities specific to local level’s initiative to address issues themselves first (prior to requesting county level).	Transcript R-14 Town of Nehoiu Vice Mayor, R-16 Head of Nehoiu Library, R-17 Environmental Inspector and Village Representative, R-25 Deputy Director (ISU Buzău), R-9 Director (Red Cross Buzău) (Additionally: general observation from researcher from preliminary and primary fieldwork), Transcript R-11 Chief of Service, (Environmental Protection Agency), R-3 Geologist (Geological Institute of Romania), Transcript R-14 Town of Nehoiu Vice Mayor, R-21 Nehoiu Shop Owner, (General observation from researcher from preliminary and primary fieldwork), Transcript R-11 Chief of Service, (Environmental Protection Agency), R-26 Representative (EPC Private Environmental Consultancy), R-3 Geologist (Geological Institute of Romania), R-8 Buzău County Sub-Prefect, R-27 Geomorphologist (IGRAC)

Table 10.1: (continued)

Category	Broad Analysis Statement	Evidence Base
<i>Resources</i>	Most evidence provided out of any category. More problems perceived by the key informants than in any other category, especially which were very closely linked as causal factors (or at least strongly influential factors) for issues in other categories (please see connections and conclusions section for further detail).	Transcript R-27 Geomorphologist (IGRAC), R-17 Environmental Inspector and Village Representative, R-13 Insurance agent (ASTRA Insurance Local Branch), Transcript R-18 Head of Nehoiu Emergency Volunteers, R-2 BLOM private planning and consulting, R-3 Geologist (Geological Institute of Romania), R-8 Buzău County Sub-Prefect, R-9 Director (Red Cross Buzău), R-25 Deputy Director (ISU Buzău), R-21 Nehoiu Shop Owner, R-22 Architect (SC Proiect Buzău Private Planning Firm), R-23 County Council Chief Architect, R-4 Romanian Space Agency, R-27 Geomorphologist (IGRAC), R-10 Head of Service (County Prefect's Office), Transcript R-11 Chief of Service, (Environmental Protection Agency), R-18 Head of Nehoiu Emergency Volunteers, R-19 Nehoiu Urban Planner, R-15 Head of Nehoiu Planning Department, R-14 Town of Nehoiu Vice Mayor, R-16 Head of Nehoiu Library, R-12 Head of Forestry & Administrator (Private Forestry Office Nehoiu), R-20 Nehoiu Police Officer, R-23 County Council Chief Architect, R-24 County Cadastral Office, R-8 Buzău County Sub-Prefect, R-9 Director (Red Cross Buzău), R-17 Environmental Inspector and Village Representative, R-27 Geomorphologist (IGRAC), R-26 Representative (EPC Private Environmental Consultancy), R-10 Head of Service (County Prefect's Office), (Additionally: general observation from researcher from preliminary and primary fieldwork)
<i>Coordination</i>	Good examples revealed in transfer of information between levels, and (mostly) positive experiences in coordination amongst actors in same horizontal levels. Some negative examples with “inaction” issue also found in Efficiency category, limiting coordinative capacities from lack of resources.	Transcript R-16 Head of Nehoiu Library, R-24 County Cadastral Office, R-11 Chief of Service, (Environmental Protection Agency), R-17 Environmental Inspector and Village Representative, R-13 Insurance agent (ASTRA Insurance Local Branch), R-14 Town of Nehoiu Vice Mayor, R-18 Head of Nehoiu Emergency Volunteers, R-17 Environmental Inspector and Village Representative, R-20 Nehoiu Police Officer, R-23 County Council Chief Architect, R-25 Deputy Director (ISU Buzău), R-22 Architect (SC Proiect Buzău Private Planning Firm), R-10 Head of Service (County Prefect's Office) (Additionally: from preliminary fieldwork meeting with ISU Buzău) Transcript R-10 Head of Service (County Prefect's Office), R-12 Head of Forestry & Administrator (Private Forestry Office Nehoiu), R-27 Geomorphologist (IGRAC) Transcript R-17 Environmental Inspector and Village Representative, R-25 Deputy Director (ISU Buzău), R-27 Geomorphologist (IGRAC), R-9 Director (Red Cross Buzău), R-10 Head of Service (County Prefect's Office), R-11 Chief of Service, (Environmental Protection Agency), R-12 Head of Forestry & Administrator (Private Forestry Office Nehoiu)

Table 10.1: (continued)

Category	Broad Analysis Statement	Evidence Base
<i>Cooperation</i>	Communication good between (vertical) and among (horizontal) levels. Good communication equated to understanding of “good” cooperation according to key informants. Perceptions positive (generally) for cooperation across sectors at local and county levels and across these levels. Some exceptions with the issue of funding and re-education for newly elected officials. Strong local connections between population and authorities. Connection weaker between population and county authorities. Good examples of volunteering and training, but more improvement still to be made.	<p>Transcript R-11 Chief of Service, (Environmental Protection Agency), R-17 Environmental Inspector and Village Representative, R-8 Buzău County Sub-Prefect, R-13 Insurance agent (ASTRA Insurance Local Branch), R-14 Town of Nehoiu Vice Mayor, R-16 Head of Nehoiu Library, R-19 Nehoiu Urban Planner, R-24 County Cadastral Office, R-27 Geomorphologist (IGRAC), R-20 Nehoiu Police Officer</p> <p>Transcript R-17 Environmental Inspector and Village Representative, R-16 Head of Nehoiu Library, R-22 Architect (SC Proiect Buzău Private Planning Firm), R-2 BLOM private planning and consulting, R-25 Deputy Director (ISU Buzău), R-9 Director (Red Cross Buzău)</p> <p>Transcript R-17 Environmental Inspector and Village Representative, R-26 Representative (EPC Private Environmental Consultancy), R-27 Geomorphologist (IGRAC), R-2 BLOM private planning and consulting, R-25 Deputy Director (ISU Buzău), R-10 Head of Service (County Prefect's Office)</p>
<i>Risk Culture</i>	Dichotomies in population of self-recovery vs. no self-recovery. Reiteration of overreliance on the county level (by county authorities). General need for increasing education to improve awareness and need to complement this with currently pressing community issues. Barriers found for focus on prevention, low priority placed on prevention, and risks in general. Good examples of informational campaigns toward improving capacity while still protecting livelihoods exist. However, key point made that requiring change that prohibits livelihood activities must be accompanied by an alternative solution for these activities.	<p>Transcript R-20 Nehoiu Police Officer, R-27 Geomorphologist (IGRAC)</p> <p>Transcript R-13 Insurance agent (ASTRA Insurance Local Branch), R-16 Head of Nehoiu Library, R-17 Environmental Inspector and Village Representative, R-27 Geomorphologist (IGRAC), R-18 Head of Nehoiu Emergency Volunteers, R-22 Architect (SC Proiect Buzău Private Planning Firm), R-23 County Council Chief Architect, R-26 Representative (EPC Private Environmental Consultancy), R-2 BLOM private planning and consulting , R-25 Deputy Director (ISU Buzău)</p> <p>Transcript R-22 Architect (SC Proiect Buzău Private Planning Firm), R-25 Deputy Director (ISU Buzău), R-27 Geomorphologist (IGRAC), R-10 Head of Service (County Prefect's Office), R-11 Chief of Service, (Environmental Protection Agency), R-16 Head of Nehoiu Library, R-14 Town of Nehoiu Vice Mayor, R-21 Nehoiu Shop Owner, R-26 Representative (EPC Private Environmental Consultancy), R-2 BLOM private planning and consulting</p>

10.2 Presentation of “good” risk governance results by category

Openness & Transparency (RO)

Many of the issues found within this category pertain to risk communication and information for risk assessment. Some issues were also revealed regarding the coherency of the information communicated and transparency of management practices. This reflects some of the main components of the category definition: *Information related to risk-management practices, and the practices themselves, should be available, accessible, and coherent for all those who assess, manage, and are/or are affected by risks both in peace and in crisis time.* Evidence indicates there are improvements in the availability of flood risk and hazard information and for dissemination of this information at the county level. However, information at the scale of the local catchment level is not available. There is information, especially from higher level authorities, that is considered secret and is, therefore, not available. The dissemination of information in general appears to be limited by resources, especially financial and hard copy materials. There is a general disagreement on whether the public has enough information. The perception depends on type of key informant, but trends in statements indicate that public authorities (such as mayors) find information adequate, while private sector and scientific researchers find the current state of information for the public inadequate. Good examples were found with informative websites; however, issues remain for those in very rural areas without access to Internet. A discussion of extending SMS alerts to the population is also considered in terms of expanding sources of information.

Table 10.2: Openness & Transparency category and indicator traffic light results

Indicator	Traffic Light Output (G/Y/R)	Evidence Base
(1) Risk and hazard information is openly available and accessible.	Green: county scale improvements in flood risk and hazard information Yellow: information made available during public inquiry period of PUG process, however issue with electronic format Red: local, catchment level not available. Some information (esp. at higher levels) perceived as ‘secret’ and therefore not available. Secrecy of risk information for individual parcels sold (local, individual level)	Transcript R-2 BLOM private planning and consulting Transcript R-22 Architect (SC Proiect Buzău Private Planning Firm), R-23 County Council Chief Architect Transcript R-3 Geologist (Geological Institute of Romania), R-21 Nehoiu Shop Owner, R-26 Representative (EPC Private Environmental Consultancy), R-27 Geomorphologist (IGRAC)
(2) This information is provided to the public in a clear, understandable language.	Red: lack of clarity of where to find information and how to determine the proper responsible authority	Transcript R-11 Chief of Service, (Environmental Protection Agency)

Table 10.2: (continued)

Indicator	Traffic Light Output (G/Y/R)	Evidence Base
(3) Risk information (including risk maps) is widely disseminated especially to the following audiences: the public, communities at risk, and decision-makers.	Green: improvement of county scale dissemination for flood risk and hazard Yellow: dissemination provided from various agencies, however coverage limited in some cases due to lack of funding and other resources	Transcript R-2 BLOM private planning and consulting Transcript R-2 BLOM private planning and consulting
(4) The public has enough information and does not have a feeling of incomplete information, especially in case of an event in which information is updated and repeated.	Yellow: public authorities state information is adequate, though not much information and people not interested to receive more information Red: private sector and scientific researchers state information not adequate for public, nothing to complement local knowledge passed through generations	Transcript R-8 Buzău County Sub-Prefect, R-14 Town of Nehoiu Vice Mayor Transcript R-26 Representative (EPC Private Environmental Consultancy), R-27 Geomorphologist (IGRAC)
(5) Multiple sources of information exist (e.g. a variety of communication methods are pursued) (FROM FIRST 5 INTERVIEWS).	Green: several very informative websites already exist Yellow: currently discussing opportunities for SMS alert Red: issue for those without access to Internet as hard copies of informational media limited	Preliminary fieldwork meetings (ISU Buzău, Environmental Protection Agency) Transcript R-17 Environmental Inspector and Village Representative, R-18 Head of Nehoiu Emergency Volunteers Transcript R-11 Chief of Service, (Environmental Protection Agency), Preliminary fieldwork meeting with ISU Buzău

Summary for Openness & Transparency:

1. There was a substantial difference in the availability of hazard and risk information for flooding as opposed to landslide hazards and risks. This depends also on the level of investigation. There have been substantial improvements at the county scale for flood hazard and risk information. This is due to the recent studies (including risk and hazard) maps completed on a national level for the implementation of the EU Flood Risk Management Directive, which have been available to the public via an online interface on the Romanian Waters Company website since the end of December 2014.¹ Using this information, the County Councils are expected to produce flood risk maps. In following up with this information, it was clear that risk and hazard maps are available on the county level for multiple scenarios up to the level of the county roads. However, it appeared that the case study site itself (the Nehoiu catchment) did not have a visible assessment for risk or hazard

¹ The risk and hazard maps are available at the county level via the following website: <http://gis2.rowater.ro:8989/flood/> (last accessed on 21.08.2016).

related information on this map.

For landslide risk and hazard information, the output of risk assessment (for example, the creation of maps as a tool for risk management and a vehicle for communicating risk information), faces several issues as it is not clear whether or not there are hazard maps for the whole country. This information is public information, but there is not a link to access this information, nor to find out if there are landslide hazard maps for all of Romania. The issues here delve into a strong perception of a high level of secrecy of information perceived by a number of interviewees. In terms of general availability of state gathered information, there is information that exists but is not publically accessible and is not accessible upon request. Some information for risk and hazard related issues has been created at the national level by various ministries but access to this information is denied.

The exchange of information, and ultimately the availability and accessibility of information between authorities and the public, is another important topic. Examples of this can be found within the public inquiry periods for planning processes in which information is provided in the final approval process of the PUG (General Urbanistic Plan). This indicates that the process involves the provision and accessibility of this information; however, some (though not all) communes have PUGs available in electronic format as public data. To view these plans, a request should be made to the president of the County Council. However, the means by which this public data is made available (via the Internet) may be a problem for those in rural areas without Internet access. One other issue was the potential lack of information for individual parcels of land. This was expressed as a concern as one local community member insisted that when buying a new parcel of land you are not informed about the risk this land might face. The community member stated that those who sell land may be untruthful about these risks because they want to sell the land.

2. There was very little evidence to indicate a traffic light output; however, there is some confusion of where to find information and to determine the proper responsible authority. One example given was with the public's understanding of whether or not to address the Environmental Protection Agency or the Environmental Guard. The latter serves as the enforcer of regulations for issues such as the monitoring of illegal deforestation while the former acts as a facilitator and provides assistance (guidance given for what permissions are needed) in the case of issues such as permits for parcel development. The Environmental Protection Agency, as stated by one of its representatives, tends to receive many questions from the public which the agency then redirects to the proper authority.

3. Evidence for this indicator was limited; however, dissemination examples were provided from ISU and for flood risks and hazards from BLOM and Romanian Waters National

Administration. One example of this is through dissemination to the public through the posters provided by BLOM to villages, municipalities, and County Councils with respect to the creation of flood risk and hazard information for the fulfilment of the European Flood Risk Management Directive. Information is also provided on the Romanian Waters Administration (regional chapter) website and the website of the Environmental Protection Agency. With regard to emergency management, risk information is also provided via the website of the Emergency Situation Inspectorate of Buzău (ISU Buzău). The inspectorate also provides hard copy information in the form of flyers and brochures. However, funding and resources for the number of flyers and brochures themselves are limited (e.g. 100-200 flyers to distribute to the entire county).

4. The direction of evidence for this indicator differs by key informant interviewed. Generally, public authorities state the public has enough information and do not want more; while, private sector and scientific researchers state that the information is not adequate and people do want more. Local authorities interviewed in the town of Nehoiu stated that there is not much information given to the public. The public can have some awareness if they have had an experience with an event but in general there is not much information. The people, according to the local authority interviewed, are not interested in having more information but rather feel that there is enough information. Similar sentiment was expressed by public authorities at the county level in the Prefecture’s office who stated that the public is, in general, satisfied with the information they have. However, with respect to environmentally related issues, the public has been stated by some non-public informants as confused in terms of not having enough information and that it is not necessarily a lack of interest but a lack of information in terms of how to be involved in the decision-making process for public projects. This need for more information was reiterated by another private sector informant, who communicated that people would like to know more.

5. Multiple forms exist for different purposes: sirens and church bells (for alerting people in the case of an event), informative websites (for precautionary and preventative measures, e.g. from ISU, the Environmental Protection Agency, and the Romanian Waters Administration), as well as hard copy posters and flyers. Options were also being discussed as to whether information should be provided during crisis time via SMS. Some informants think this would be a good idea. Currently, information is sent this way from ISU Buzău to the local emergency situation committee at the town level. The discussion is whether this should also be sent to 2000 other people as a warning mechanism. Information communicated via SMS would (preferably) be distributed to selected numbers in order to have equal distribution throughout all of Nehoiu and its territory.

Accountability (RO)

The category Accountability defined as: **Roles and responsibilities (and the distribution thereof) must be clear and a form of evaluation, reporting, monitoring, and or maintenance of actions, measures and systems should exist to ensure the fulfillment of these roles and responsibilities** featured a wide range of evidence indicating a general lack of monitoring activities but also examples of local scale mechanisms and at least one county level initiative to improve this general issue.

Table 10.3: Accountability category and indicator traffic light results

Indicator	Traffic Light Output (G/Y/R)	Evidence Base
(1) Risk management procedures, including their supporting policies and legal framework, are clear and coherent.	Green: regulatory guidelines generally stated as clear and good (with some exceptions) Red: exception to above is the legal framework for landslide risk assessment (Law of 1996)	Transcript R-11 Chief of Service, (Environmental Protection Agency), R-12 Head of Forestry & Administrator (Private Forestry Office Nehoiu), R-23 County Council Chief Architect, R-27 Geomorphologist (IGRAC) Transcript R-23 County Council Chief Architect, R-27 Geomorphologist (IGRAC)
(2) The differentiation of responsibilities between and within different levels is clear and avoids problematic overlaps.	Green: responsibilities amongst local level authorities is clear, no conflicting overlaps Yellow: responsibilities amongst county level authorities also relatively clear, though some exceptions of conflict Red: some conflicts between local and county level entities and some lack of clarity between public and county level entities	Transcript R-18 Head of Nehoiu Emergency Volunteers, R-20 Nehoiu Police Officer Transcript R-9 Director (Red Cross Buzău), R-12 Head of Forestry & Administrator (Private Forestry Office Nehoiu), R-22 Architect (SC Proiect Buzău Private Planning Firm), R-24 County Cadastral Office, R-27 Geomorphologist (IGRAC) Transcript R-11 Chief of Service, (Environmental Protection Agency), R-17 Environmental Inspector and Village Representative
(3) Actors (especially public authorities) are held accountable for their respective roles and responsibilities through monitoring and reporting as well as incentives.	Yellow: some checks and balances impact studies through information request mechanisms (third party checks), some self-monitoring at the local level, petitions at the neighborhood and individual level, existing monitoring of river bed clearings Red: disincentive to follow through with enforcement of fines at local level, mechanisms to uphold accountability needed for poor “apartment firm” hazard and risk assessments	Transcript R-2 BLOM private planning and consulting, R-9 Director (Red Cross Buzău), R-10 Head of Service (County Prefect's Office), R-11 Chief of Service, (Environmental Protection Agency), R-18 Head of Nehoiu Emergency Volunteers, R-22 Architect (SC Proiect Buzău Private Planning Firm) Transcript R-2 BLOM private planning and consulting, R-3 Geologist (Geological Institute of Romania), R-13 Insurance agent (ASTRA Insurance Local Branch), R-16 Head of Nehoiu Library, R-25 Deputy Director (ISU Buzău)

Table 10.3: (continued)

Indicator	Traffic Light Output (G/Y/R)	Evidence Base
(4) Check-ups such as reviews, monitoring and maintenance exist in terms of implemented actions, measures and systems. (also supported from first 5 interviews)	Yellow: forestry monitoring network now in effect, some terrain monitoring, review and update of PUGs severely lacking but county initiative attempts to fund and improve status Red: general monitoring activities rough and limited	Transcript R-12 Head of Forestry & Administrator (Private Forestry Office Nehoiu), R-19 Nehoiu Urban Planner, R-27 Geomorphologist (IGRAC) Transcript R-2 BLOM private planning and consulting, R-3 Geologist (Geological Institute of Romania), R-8 Buzău County Sub-Prefect, R-19 Nehoiu Urban Planner
(5) Maintenance of structural mitigation measures is taken into account by relevant authorities. (FROM FIRST 5 INTERVIEWS)	Red: issues present with maintaining the valley and clearing away rubbish and regarding adequate construction parameters for bridges	Transcript R-14 Town of Nehoiu Vice Mayor, R-17 Environmental Inspector and Village Representative, R-18 Head of Nehoiu Emergency Volunteers, R-22 Architect (SC Proiect Buzău Private Planning Firm), R-25 Deputy Director (ISU Buzău)

Summary of Accountability:

1. Though there are some exceptions, generally policies and legal frameworks are perceived as clear and coherent. Regulatory guidelines have generally been stated as clear and good (with the exception of the legal framework for landslide risk assessment). Informants, when asked about the regulations pertaining to their work, explained these regulations were relatively clear and coherent. This was especially true for regulations that involve coordination between authorities. However, the main issue is that regulations are not always respected and applied in practice. This issue is explained in greater detail within the Effectiveness category. With the aforementioned exception, some issues exist in the Law of 1996 with regard to map making. The law has not been updated, though advances in science have been made. The result of this lack of update is a current confusion of interpretation of concepts such as risk, hazard, vulnerability, and consequence. The consequence has a wide variety of interpretation in the content of maps produced by various companies who are contracted to provide these maps to county administrators. This creates confusion for the decision-makers in the County Councils who do not know what they are looking at in the maps. At the time of the fieldwork, this was being discussed as an important and controversial issue.

2. Responsibilities amongst different authorities are generally pretty clear for local authorities and county level authorities, with some exceptions within the county level and some issues for improvement between local and county level. Responsibilities are indicated as clear amongst local level authorities as everyone generally knows what they are supposed to do. Though some overlaps exist at this level, none are problematic (tasks still remain

complementary). Some exceptions to the general trend were found, for example, with the forestry authorities and the county in terms of cases in which the county might not agree with the forestry agency's plan. This is an overlap that occurs when the protected areas belong to the county but the forestry agency has a plan for this area. One other example lies in the organized garbage clean up along the rivers at the local level that provides an opportunity for social aid, but also an overlapping of responsibilities with the Romanian Waters Administration. Technically, the cleanup and maintenance are the responsibility of the the Romanian Waters Administration; however, fines can and have been issued for those taking over this responsibility through the social aid program.

The regional level appears to be similar to the local level (e.g. there are few overlaps and even fewer conflicting responsibility examples). There are some cases, for example between the Cadastral Office and other authorities, in which no overlaps occur and other cases, such as with the Red Cross and the county administrative authorities, in which overlaps exist but do not result in conflict. For private institutes (e.g. planning firms), there are no conflicting overlaps once they have a contract. There are overlaps in terms of other institutions doing the same thing but this is only during the competition for getting a contract in the first place. There is, however, a substantial overlap between geologists and geomorphologists. The geomorphologists use catalog data as this is understood as the best available data (provides a range rather than a specific point of reference). Geologists, in contrast, argue in favor of specific point information to the discredit of a range. In performing assessments (e.g. for landslide hazard), this provides a conflict of methods used for similar work (e.g. risk and hazard assessment and mapping). One last point is the issue of potentially overlapping responsibilities and confusion as to who is responsible for what kinds of complaints (see aforementioned example with the environmental authority representative).

3. Some mechanisms for checks and balances for impact studies and some self-monitoring occur at the local level including neighborhood and town hall monitoring of activities, although there is an issue in lack of penalty enforcement. Some self-monitoring exists at the local level in part due to a bottom up distribution of responsibility legally prescribed by local autonomy, in which plans at the local level (and any other information that the communes provide) are taken by the county level and used for the county level territorial management plan. The town hall is also responsible for enforcing the nationally mandated insurance requirement, but is disinclined to do so because they would have to charge people fees. When this is the case, the burden of enforcement can fall upon the prefect. At the individual level, there are cases in which people will not follow the law and will change flow paths of waterways (small streams, rivers, etc.). Reporting mechanisms in practice in these cases are typically petitions created by an affected neighbor. Inspections are not

normally made outside of this reporting process. Issuing penalties and fines is usually also avoided. Other local level inspection procedures include the monitoring of river bed clearings conducted through the social aid program. This includes checking if procedures for clearing and digging were done properly via "incognito" monitoring from the mayor's office.

Additional issues include a need for greater accountability and reporting mechanisms for "apartment firms" providing poor hazard and risk assessments (e.g. system to hold them liable in the case of damages as result of poor assessment). There are some checks and balances in place, however, for impact studies and plans. In the case that there is uncertain or questionable information in a plan, it may be requested that a third party provide a report or additional documentation. This can be seen as a good example of what is done to double check and ensure adherence to responsibilities in the creation of the study. Regarding the creation of plans, there are legal mechanisms in place to check and provide final approvals. For projects and plans at the local level, the town hall checks that requirements are fulfilled; however, for big industrial facilities, approval is needed from the County Council. Private firms can also provide checks to determine if the plans are correct in their consideration of the different probabilities, such as where the water extends and consequential limits for new constructions per river segment. In this case, what is provided is more of an advisory statement and not a legally binding requirement. The extent to which this is followed depends on the interests of local decision makers and those who are proposing the plan. In some cases, people are able to still build near the river when they really should not be able to receive an environmental permit to do so.

4. Some monitoring systems are in effect (e.g. forestry), but current monitoring activities are seen as rough and limited. Examples include:

- the poor state of reviews and updates for General Urbanistic Plans for many communes, although county initiatives hope to provide funding and improve this situation
- some monitoring for forestry exists, but was put into place in 2000 and only in the last few years has there been a network for monitoring this in Romania
- monitoring of the general terrain conducted at the local level through visual monitoring as often as the surveyor (in this case the local urban planner) deems necessary (no regularly required monitoring or inspection of the terrain)²

There is a desire for more monitoring activities than the rough and limited number that currently exist; however, this is restricted due to lack of funding. This can be interpreted as a cause for ineffective monitoring, particularly as some informants state that each year

² There are, however, examples of some monitoring for specific locations, such as the Cirlesti mudflow site downstream from Nehoiu.

some of the same spots are affected by flooding but nothing is done to prevent this continuation of flood impacts. Although there is a legal system in place for checking and monitoring requirements for various hazardous conditions, the extent to which this is implemented is questionable given that authorities charged with the responsibility to monitor do not have adequate staff. Responsibilities for prevention and mitigation according to county level authorities lie with the commune (the local level), not the county. The local level is responsible for having a flood and a landslide risk map and must review and update their General Urbanistic Plans every 10 years. However, the fact that this update does not occur (and has not occurred in the last several decades) in Nehoiu indicates an issue or gap that should be better understood in attempting to fulfil these responsibilities. Even outside of Nehoiu, there is a general perspective that maps are often not updated as regularly as they should be. However, there is currently an attempt to improve this updating process through a county level initiative that provides funding for updating the many outdated commune plans.

5. There is little evidence to indicate much focus on maintenance of mitigation measures, with critical points highlighted as maintenance of water ways including consideration for infrastructure such as bridges. With respect to maintenance or damage repair, it appears this occurs at only certain points. Related to Indicator 2, another issue was found in maintaining the valley and clearing away rubbish. According to local authorities, this should be the responsibility of each household, but this typically is not taken care of. Another concern voiced is that greater thought must go into the construction as well as maintenance of critical infrastructure; specifically, there is a need to ensure that bridges are not only well maintained over time but also from the start constructed in a way as to allow a minimal amount of debris and water flow that might occur during an event. This needs to be taken into account to prevent future problems similar to what occurred in Nehoiu during the 2005 event.

Participation (RO)

The category of Participation is defined within the system as follows: **Stakeholders (including the local community) are involved through consultation or through higher forms of participation integrating local knowledge through means such as public projects and events as well as feedback systems in policy implementation.** It was generally perceived that involvement is relatively low for prevention and response activities (though mechanisms exist to involve the population). Some good examples were found in communication pathways and two-way communication through new local leadership and the village representation system, although there was no evidence to indicate ownership or co-ownership in decision-making. More public education was stated as needed, although there are some current efforts from a variety of county level authorities

to work especially with children. A very strong reliance was found with the integration and general use of local knowledge for decision-making (at both local and county levels). There was insufficient evidence to derive key points or patterns for the feedback systems in Indicator 5.

Table 10.4: Participation category and indicator traffic light results

Indicator	Traffic Light Output (G/Y/R)	Evidence Base
(1) The community is involved and is encouraged to be involved in consultation activities featuring a wide range of stakeholders as well as a focus on both prevention and response.	Red: involvement is relatively low in both preventative as well as response activities, although some mechanisms for involvement exist	Transcript R-11 Chief of Service, (Environmental Protection Agency), R-14 Town of Nehoiu Vice Mayor, R-22 Architect (SC Proiect Buzău Private Planning Firm), R-23 County Council Chief Architect, R-24 County Cadastral Office, R-25 Deputy Director (ISU Buzău), R-27 Geomorphologist (IGRAC)
(2) Stakeholders (including the public) are “actively involved”, or at least are enabled to be “actively involved”, via two-way communication as well as both bottom-up and top-down pathways.	Green: improvement in potential for more active communication pathways through positively viewed new local leadership as well as strong village representation system Yellow: in general, examples given of active involvement potentially inhibited by lack of information as to how to get involved in some processes (e.g. development proposals), but also well attended meetings for flood risk mapping (country-wide) Generally, however, no evidence base to indicate ownership in decision-making	Transcript R-16 Head of Nehoiu Library, R-19 Nehoiu Urban Planner Transcript R-2 BLOM private planning and consulting, R-26 Representative (EPC Private Environmental Consultancy)
(3) Efforts to raise awareness and educate the population through means such as public projects and events about DRR exist, especially those which pay attention to children and people in high risk areas.	Yellow: although more public education is needed according to several informants, there are educational efforts conducted by county level authorities including ISU Buzău, the Environmental Protection Agency, the Red Cross, and the Institute of Geography – especially with attention paid to educating children	Transcript R-9 Director (Red Cross Buzău), R-11 Chief of Service, (Environmental Protection Agency), R-18 Head of Nehoiu Emergency Volunteers, R-27 Geomorphologist (IGRAC)
(4) Local knowledge including practical experience is used in decision-making and enables bottom-up input.	Green: very strong reliance and integration of local knowledge evident from existing monitoring activities and the integration of this knowledge not only into local but also county level decision making	Transcript R-17 Environmental Inspector and Village Representative, R-10 Head of Service (County Prefect’s Office), R-19 Nehoiu Urban Planner, R-23 County Council Chief Architect

Table 10.4: (continued)

Indicator	Traffic Light Output (G/Y/R)	Evidence Base
(5) Feedback systems exist enabling the ability to receive input on policy implementation.	Insufficient evidence to identify patterns or make key point conclusions	Not applicable

Summary of Participation:

1. Involvement is relatively low in both preventative and as well as response activities, although some mechanisms for involvement exist. Reasons for this include lack of public interests especially compared to other priorities (though this depends also on the area) and the prerequisite of having the visible involvement of a local leader. Though there are mechanisms in place to enable participation such as in public commentary on the PUG and in raising issues to be considered by a special commission at the Environmental Protection Agency, the public is not involved much in planning. Furthermore, some key informants stated there is not much public interest in this unless there is an investment or something being planned that effects them directly or is right next to them. A reiterated point was made with respect to responding and taking action during an event: though some people get involved, this depends on the area and in some communities in rural areas and the plain it is more common than not that people do nothing but wait for others to intervene first. In the context of emergency management, it was also stated that involvement of the population is low, even though there are efforts to include them. Though local authorities try to get more people involved and are involved themselves, again, the public is not involved and will need to see a local leader before this happens. A reiterated reason for the lack of participation is that this is considered as a quite low priority as compared to other priorities like unemployment and lack of financial resources.

2. At the local level there appears to be substantial improvement in potential for more active communication pathways through both a positively viewed new local leadership as well as strong village representation system (enabling bottom-up communication). In general, examples were given featuring both negative and positive communication pathways. For example, involvement can be potentially inhibited by lack of information as to how to get involved in some processes (e.g. development proposals), while at the same time there are examples of well attended meetings for flood risk mapping (country-wide). One interesting take especially for environmental issues was that lack of involvement is not necessarily a lack of interest but a lack of information in terms of how to be involved in the process, such as how to block an undesired process or development proposal. However, within this same topic, examples were given by interviewees in which an environmental debate was held and no one attended but many protested on the day of the project implementation; while

another examples was given in which there was a public debate on risk maps for flooding for all of Romania with high attendance. Overall, however, there is no evidence base to indicate ownership in decision-making as a visible component of “active involvement”.

3. According to several informants primarily at the county level, more public education is needed although educational efforts conducted by county level authorities do exist. This is considered especially important in terms of trying to change behavior at the local level. These efforts include educational campaigns from ISU Buzău, the Environmental Protection Agency, the Red Cross, and the Institute of Geography. Most of these campaigns also pay special attention to educating children. A sentiment that has been reiterated is that one actor, specifically ISU Buzău provides the bulk of the effort made toward education and general awareness campaigns for risk-related information. This is something that has been reflected in the perspective of not only ISU but agencies including the Environmental Protection Agency, the County Prefect, and a number of research based and private firms. Some good examples of how to involve children in awareness campaigns can be found in the use of a research station in Pătârlagele, a neighboring town downstream of Nehoiu (a key project of the work of the Institute of Geography). Another example is found on a large scale with yearly exercises run by a range of actors (including ISU Buzău, local municipal authorities and emergency volunteers) with high schools and factories in the case of a breakage in the neighboring Siriu dam.

4. There is a very strong reliance and integration of local knowledge including observations from existing monitoring activities. This is a result of both the local urban planning officials (who conduct, although irregular, self-checks) and the local village network system. The integration of this knowledge occurs not only for local planning purposes but also for (often automatic) acceptance and use within county level decision making, reflecting implementation of local autonomy in-practice and places particular focus on participation of the local level through the integration of experiential knowledge. In the former, local municipal technicians especially those working in urban development perform monitoring activities and report information on experiential basis, which includes field observations such as identifying cracks and using local knowledge of soil and geology to determine potential dangers. This information is used and integrated by the local planning department, and contributes to decision-making at the town hall level. County level key informants communicated that this local level knowledge is of high importance and is used and integrated as an evidence base into county level planning and decision-making (the acceptance and integration, again, is in large part related to local autonomy). The village representation system, representing the latter example, provides a further means of field observations and input from inhabitants from the most local level upward.

5. There was insufficient evidence to identify patterns or make key point conclusions from the key informant input. This indicator refers to more of a second phase process of feedback in policy implementation, which, at least from the available evidence, appears to be non-existent.

Strategic Vision (RO)

The next category, entitled “Strategic Vision” is defined as the existence of the following: **Stakeholders work toward a future goal that is sustainable, considers both short and long term foci, and integrates DRM into policy planning and programing.** For the case of the Nehoiu catchment, this proved to be a difficult category with which to provide substantial evidence much beyond the reiterated point that it is difficult for the key informants and for stakeholders in general to have a strategic vision. The reasons for this leaned primarily on limited resources and the consequential inability to plan for the long term.

Table 10.5: Strategic Vision category and indicator traffic light results

Indicator	Traffic Light Output (G/Y/R)	Evidence Base
(1) Goals toward realizing this vision include integrating DRM into policy, planning and programing across sectors, targeting vulnerability reduction and local capacity strengthening.	Red: (in general) limited capacity, especially resources, strongly inhibits ability to develop and realize goals for DRM (for both regional and local, but especially local level)	Transcript R-14 Town of Nehoiu Vice Mayor, R-17 Environmental Inspector and Village Representative, R-18 Head of Nehoiu Emergency Volunteers, R-23 County Council Chief Architect (Additionally: general observation from researcher from preliminary and primary fieldwork)
(2) The vision and its policies concerning risk and vulnerability reduction are sustainable (follows according to the sustainable development principle), especially for flood risk management policies.	Green: limited evidence, although one example of sustainable focus on reforestation and balancing forest grown and harvest Yellow: Upon follow up investigation, development of a sustainable development strategy for the town of Nehoiu (does not address flood risk management)	Transcript R-12 Head of Forestry & Administrator (Private Forestry Office Nehoiu) (Additionally: updated website of the town of Nehoiu, see www.primaria-nehoiu.ro/?s=Strategia+de+dezvoltare+durabila+a+orasului+Nehoiu&submit.x=0&submit.y=0 last accessed 29.07.2016)

Table 10.5: (continued)

Indicator	Traffic Light Output (G/Y/R)	Evidence Base
(3) Strategies follow a particular timeline that includes short and long term foci that is positively perceived by both authorities and the public.	Red: similar to Indicator 1, long term goal not possible due to inability to even achieve short term goals and to address immediate problems Yellow: desire for long term focus (voiced by both local and county level actors)	Transcript Town of Nehoiu Vice Mayor, R-17 Environmental Inspector and Village Representative, R-18 Head of Nehoiu Emergency Volunteers, R-23 County Council Chief Architect Yellow: same as above transcripts (Additionally: general observation from researcher from preliminary and primary fieldwork (for both red and yellow))
(4) There exist the same or similar priorities within the overall strategy or activities of various actors (from Risk Governance Deficits not policy docs).	Red: local level common priority to have better equipment (resources in general), common priority across several county level informants to improve laws for landslides risk assessment, improve public involvement, and try to manage as best as possible under limited resources	Transcript R-9 Director (Red Cross Buzău), R-10 Head of Service (County Prefect's Office), R-12 Head of Forestry & Administrator (Private Forestry Office Nehoiu), R-14 Nehoiu Vice-Mayor, R-17 Environmental Inspector and Village Representative, R-18 Head of Nehoiu Emergency Volunteers, R-23 County Council Chief Architect, R-25 Deputy Director (ISU Buzău), R-26 Representative (EPC Private Environmental Consultancy), R-27 Geomorphologist (IGRAC)
(5) There is evidence of a structure based on goal orientation for realizing a future vision (FROM FIRST 5 INTERVIEWS).	Yellow: limited evidence of existing structures, though some existing from national level (top-down). Follow up indicates start to local level future vision process	Transcript R-11 Chief of Service, (Environmental Protection Agency), R-22 Architect (SC Proiect Buzău Private Planning Firm); (Additionally: Personal Communication, Dr. Mihai Micu, 16.02.2016) and Nehoiu sustainable development strategy)

Summary of Strategic Vision:

1. Key issues were identified that substantially limit the ability to realize and even generate a future vision in the first place including: lack of information, lack of financial resources, and higher attention to more immediately visible issues. In general, it was considered desirable by a wide variety of actors (both local and county level) that strategies must exist that ensure the safety and security of the population, and reduce risks especially for highly vulnerable areas; however, there are substantial capacity-related limitations to generating and maintaining a coordinated strategy amongst citizens and actors for different planning, policy, and programming and across sectors.

2. There was very little evidence toward indicating an existing and positive or negative focus on sustainability for local strategies, although one example was found in a local private forestry agency. In this example, sustainability as a long term goal is sought through reforestation, especially with regard to balancing between harvesting and the growth of

the forest. Another example is found in the sustainable development strategy for the town of Nehoiu, although it does not have a focus on addressing flood risk management.³

3. In general, lack of financial resources appears to be the primary reason for this in combination with the need to remediate many current and more immediate problems. Although there is a desire to have more long term strategy development, they cannot have a long term goal because of the inability to even achieve the short term goals and activities (many places currently require attention but face extremely limited resources).

4. Priorities at the local level appear to be consistent across different key informants, although they indicate problems with respect to needing better resources, especially equipment. At the county level, recognized priorities include: establishing agreement on a methodology for landslide risk assessment resolving a current problem originating in the 1996 legislation for landslide assessment and enabling having basic information needed to permit medium to long term planning with respect to this hazard); more public involvement; greater EU project funding; and to do the best they can within limited resources.

5. Very limited evidence of implemented structures for achieving future vision exists, aside from some structures that are given from the national level (e.g. for environmental protection). However, upon follow up to this point, there is the aforementioned sustainable development strategy for the town of Nehoiu (Strategia de dezvoltare durabila a orasului Nehoiu) and the recent improvement toward development of community organizations (called Grupurilor de Acțiune Locală or “GALs”) for agriculture and rural development.⁴

Effectiveness (RO)

The category of Effectiveness is defined in the research as follows: **Disaster risk management frameworks consist of efforts which are flexible, and enable the ability to achieve strategy objectives and end-goals.** With respect to this category, little evidence was gathered for the ability of past experiences to enhance achievement of overall goals. There was similarly little evidence for the effectiveness of Early Warning Systems (EWS). Issues arose for preparedness, including lack of education and training, as well as corruption. Flexibility appeared to be a more easily addressed topic than redundancy (though with some variations as to what is considered too strict versus adequately flexible); while the biggest issue of all appears to be a lack of adherence to legal requirements.

³ To view the PDF of this strategy, please refer to the Nehoiu municipal website at: www.primaria-nehoiu.ro/?s=Strategia+de+dezvoltare+durabila+a+orasului+Nehoiu&submit.x=0&submit.y=0 (in Romanian, last accessed 29.07.2016)

⁴ Personal communication with Dr. Mihai Micu, via Skype, on February 16th 2016 (see http://www.madr.ro/docs/dezvoltare-rurala/Axa_LEADER/gal-romania-update-16.07.2013.pdf for further evidence)

Table 10.6: Effectiveness category and indicator traffic light results

Indicator	Traffic Light Output (G/Y/R)	Evidence Base
(1) Assistance provided (e.g. in past experiences) helps achieve overall or end goals.	Yellow: some (although limited) evidence at local level for emergency management and planning practices indicating practices flexible enough to enable learning from past experiences (connection to Indicator 4)	Transcript R-14 Nehoiu Vice-Mayor, R-17 Environmental Inspector and Village Representative
(2) Early warning systems fulfil their purpose by alerting appropriate bodies to disasters and threats.	Yellow: also limited evidence, but indication that EWS work reasonably well including long standing practices (e.g. church bells), although some issues remain (e.g. alerting isolated areas)	Transcript R-25 Deputy Director (ISU Buzău), R-16 Head of Nehoiu Library
(3) Authorities, individuals and communities are well-prepared.	Red: level of preparedness rests with the level of education and training (or lack thereof), especially concerning two issues: re-education of each new local administration, and lack of preparedness training (especially technical skills)	Transcript R-11 Environmental Protection Agency Representative, R-18 Head of Nehoiu Emergency Volunteers
(4) Flexibility and redundancy are demonstrated and enable a response to adapt to change while still ensuring capacities to meet goals (e.g. through updating policies in response to change) (also from Risk Governance Deficits).	Yellow: see evidence provided in Indicator 1 (flexibility of emergency management and planning practices at the local level with respect to learning factor) Red: no redundancy evidence, flexibility needed in use of legal standards for assessment and in general for implementing county level guidelines at local level and in implementing EU directives at all levels (e.g. need flexibility to adapt to local specificity)	Transcript R-14 Nehoiu Vice-Mayor, R-17 Environmental Inspector and Village Representative Transcript R-17 Environmental Inspector and Village Representative R-3 Geologist (Geological Institute of Romania), R-2 BLOM private planning and consulting
(5) Regulatory frameworks are upheld and achieve their purpose in practice (FROM FIRST 5 INTERVIEWS) (also from Risk Governance Deficits)	Red: lack of enforcement of the “rule of law” in terms of implementation of legal requirements including the following issues: illegal building and permit issuance; continued local level violations in favor of traditional practice (due to lack of education); lack of required personnel at local level, lack of required plans, plan updates and information for risk and hazard map creation (all attributed to lack of funds)	Transcript R-23 County Council Chief Architect, R-11 Chief of Service, (Environmental Protection Agency), R-26 Representative (EPC Private Environmental Consultancy), R-2 BLOM private planning and consulting, R-3 Geologist (Geological Institute of Romania), R-9 Director (Red Cross Buzău), R-10 Head of Service (County Prefect’s Office), R-16 Head of Nehoiu Library, R-24 County Cadastral Office, R-22 Architect (SC Proiect Buzău Private Planning Firm)

Summary of Effectiveness:

1. Although there was limited evidence for this indicator, some evidence exists to conclude that practices at the local level for emergency management are felt to be flexible enough to

handle different kinds of events and to enabling learning from past experience. Similarly for local level planning, plans are stated as being not very strict, but rather flexible and adaptable in order to learn from experiences. This evidence connects well to Indicator 4 but provides a learning element from past experience.

2. Though there was also limited evidence for this indicator, officers from the Emergency Situation Inspectorate of Buzău stated that the EWS work reasonably well, but that some issues remain with how to warn those who are in isolated areas. There is a potential issue of whether or not local techniques such as the ringing of the church bell are able to be heard by those farther up the catchment, but it is in general considered to be an early warning system that works well because it is a long standing practice that everyone understands.

3. The level of preparedness appeared to rest with the level of education and training (or lack thereof) at the local level. Several key issues can be mentioned, including: first, the continuous re-education cycle of each new mayor or vice mayor and their administration; and second, the issue of a lack of preparedness training (e.g. there is a desire for more, especially technical training and knowledge).

4. Evidence was found to support particularly the flexibility part more so than the redundancy; and it is assumed (by the researcher) that this is in part due to the fact that redundancy also implies redundant resources, which in this case largely do not exist. Legally binding guidelines at the county level are considered at the local level to be very strict. However, (again at the local level) the implementation of these guidelines should be more flexible in order to adapt to the local situation and contexts and allow more discussions among the local people in how to implement these requirements. This was similar for scientific institutions and private firms; informants from which stated that they are 1) only permitted to use the given standards and cannot use other methods; 2) with respect to urban planning, legislation for assessment is outdated and there is there is a lack of acceptance in attempting to update the legal standards for landslide assessment as well as for urban planning; and 3) there is a need for flexibility in the implementation of EU directives such as the EU Floods Directive to “national and cultural specificity” (quote from BLOM representative, R-2).

5. By far one of the biggest issues for this case. Evidence gathered is directly related lack of enforcement of the “rule of law”. Nearly all interviewees stated that (in general) legal frameworks exist but in-practice are not adhered to. The issue is not that the law is incomplete or does not exist, but it is its application that proves to be challenging. Reasons for this include:

- at the individual level, people who are violating the law feel they can continue to follow the practices of their ancestors (e.g. burning fields, living on land at risk to landslide) even though the land is changing and is not the same as it was before
- it is relatively easy to obtain a building permit even for areas that are quite dangerous (e.g. illegal buildings such as saw mills built right up next to the river) and in general lack of enforcement of building requirements stipulating where you are and are not allowed to build (especially since the Revolution of 1989)
- the avoidance of having and updating legally required General Urbanistic Plans (PUGs), especially given difficulty in identifying rightful ownership of land after the Revolution of 1989 and the cost of creating and updating these plans⁵
- the lack of funding inhibiting: risk and hazard map creation at level of County Council, environmental protection and medical (e.g. doctor and nurse) personnel at the local level, and adequate information resources (at all levels)

The issue presented by these authorities is that the legal framework (in general and with few exceptions) does not need to be improved or changed, but applied; it is a problem of funding and not of the legislation itself.

Efficiency (RO)

With respect to Efficiency, defined as: **Resources, including time, are not wasted but rather optimized through efforts made at the lowest, most appropriate level within an adequate timeframe and pursuing best practices and technologies**, little evidence was amassed through the information provided by key informants. In general, it appears that it is difficult to even get to the topic of efficiency without first discussing issues pertaining to lack of resources. However, conclusions can be drawn with respect to issues with actions being taken at the most appropriate level (key issue of inaction at local level and reasons for this), efforts to limit “red tape” at the county level for emergency management, some issues of (lack of) best practice implementation for public infrastructure, and some positive perception although also limitations for timeframe for carried out actions.

⁵ For reference: Legal requirements stipulate first creation of the general plan, then the zonal plan, and then the detailed plan. However, in practice, the order of creation is often completed in reverse.

Table 10.7: Efficiency category and indicator traffic light results

Indicator	Traffic Light Output (G/Y/R)	Evidence Base
(1) Actions are appropriate and are taken at the most appropriate level, reflecting the subsidiarity principle.	Green: at the local level there is substantial improvement and positive public perception of how actions are taken on the part of the new mayor Red: issue in terms of inaction at the local level and overreliance on the county level authorities (especially ISU Buzău) to manage events for reasons including: local level are volunteers vs. ISU as professional service (disincentive to act) and limited local level resources	Transcript R-16 Head of Nehoiu Library, R-14 Town of Nehoiu Vice Mayor Transcript R-27 Geomorphologist (IGRAC), R-25 Deputy Director (ISU Buzău), R-17 Environmental Inspector and Village Representative
(2) Resources are used wisely and sustainably through means such as pooling to ensure optimized and continued use in the long-term.	Insufficient evidence to identify patterns or make key point conclusions	Not applicable
(3) Duplication of work and excessive costs are avoided.	Green: although limited evidence, some efforts at the prefecture are made in the case of emergency to reduce “red tape” (reduction of preapprovals/ bureaucratic process) and allow for streamlining of emergency management procedures Red: also limited evidence, but revealed issue of difficulty for NGO actors to manage emergency situations and still be financially efficient when there are more volunteers than needed	Transcript R-8 Buzău County Sub-Prefect Transcript R-9 Director (Red Cross Buzău)
(4) Best practices and best technologies are pursued.	Red: limited evidence, however issue present that public infrastructure (e.g. roads) built inefficiently and not meeting necessary parameters	Transcript R-3 Geologist (Geological Institute of Romania), R-25 Deputy Director (ISU Buzău)
(5) Efforts are carried out within an adequate timeframe, enabling both information exchange between multiple levels for authorities and first responders, as well as attention given to preventative actions prior to disaster (both from policy and interview transcripts).	Green: authorities at all levels able to mobilize well and are alerted in timely manner (though limited evidence, observations indicate general positive perception for timeframe of county level main emergency management actor, ISU Buzău) Red: closest fire brigade is 20 minutes from the town of Nehoiu, no evidence indicated focus placed in this regard to preventative actions prior to disaster	Transcript R-27 Geomorphologist (IGRAC) (Additionally: general observation from researcher from preliminary and primary fieldwork) Transcript R-18 Head of Nehoiu Emergency Volunteers

Summary of Efficiency:

1. Whether actions are appropriate and at the most appropriate level depends in part on the perception the community has of the local main actor (the mayor) and how well he does his job, which in the case of Nehoiu has greatly improved with the new mayor. However, there is a substantial (and much bigger) issue voiced by primarily county level informants that there is inaction at the local level and that people at the local level will often wait for ISU to arrive before any intervention takes place in the case of emergency. The reason for this is explained as follows: there are some efforts at the local level to intervene and take action in the case of emergency (e.g. police trying to reroute traffic). However, local authorities are often overwhelmed and state they do not have the resources to deal with the event. The national and regional level will ask the local level whether this level has tried to take actions themselves before asking for support. The local level will reply stating they have tried, but the higher levels do not trust that the local levels have done so because, from experience, there is a tendency for the local level to call immediately for support. From the perception of the local level, they consider that:

- ISU is paid service for providing emergency services and they (local level) are only volunteers
- local level intervention, therefore, (theoretically) lasts until the arrival of ISU personnel from the county level although (practically) they try to work alongside the ISU professionals
- the local level has extremely limited resources

This is an interesting point because this implies that the local level has no official responsibility to act when the professionals have arrived. This can be triangulated with statements from the county level that demonstrate a perception that the county level emergency professionals (ISU) bears the brunt of the burden in all cases in which they are involved, which (it is typically perceived) involve little to no action of the people at the local level.

2. There was insufficient evidence to identify patterns or to make key point conclusions for this indicator in this particular case.

3. Limited evidence, although some examples exist of attempts to minimize excessive cost and duplication of work including attempts from the prefecture to avoid approvals and notifications that would deter immediate intervention in the case of emergency. This is seen as efficient because there is not too much 'red tape' (pre-approvals/bureaucratic process) in order to intervene. However, a different issue appeared for non-governmental organizational actors involved in DRM though difficulty in managing an emergency situation when there are more volunteers than needed, especially in attempting to be able to be financially

efficient.

4. Although limited evidence exists, informants communicated that some infrastructure development (e.g. roads example given here) are inefficient and do not reflect the parameters which should be taken into account for the physical environment (e.g. like the variation in temperature). These resources (public infrastructure) are stated as built to specifications that do not withstand much resistance.

5. With regard to the response phase in terms of response rate, authorities at all levels are generally stated as able to mobilize themselves well and are alerted in a timely manner. No evidence indicated focus placed in this regard to preventative actions prior to disaster. (Also limited evidence, although from observations can determine generally positive perception of at least the response of the county level main emergency management actor, ISU Buzău). However, an issue at local level exists in that the closest fire brigade is 20 minutes from the town of Nehoiu.

Equity (RO)

The existence of Equity is understood as follows: **Strategies do not disadvantage particular groups, but rather encourage intergenerational equity and solidarity through non-discriminatory strategies, especially those assisting vulnerable groups and areas.** Key points allude to issues with particularly the inability to reach isolated areas, some (limited) evidence toward examples of partiality in decision making and actions, examples but also improvement in issues of favoritism, and also a good example for social welfare programs (with some caveats). Additional evidence supports implications extending beyond the coverage of the indicators, providing insight into the importance of the physical (or territorial) part of the spatial context and the role this plays above other factors in contributing to the vulnerability of local populations.

Table 10.8: Equity category and indicator traffic light results

Indicator	Traffic Light Output (G/Y/R)	Evidence Base
(1) Adaptation does not disadvantage future generations, reflecting promotion of intergenerational equity.	Insufficient evidence to identify patterns or make key point conclusions	Not applicable

Table 10.8: (continued)

Indicator	Traffic Light Output (G/Y/R)	Evidence Base
(2) Attention is paid especially to those places that are isolated and or have special needs as a consequence of their difficult geography.	Green: good example found in the relocation of people living in vulnerable areas after the events in 2005 Red: several examples of key issues including: people living in hazard prone areas without required insurance, perpetuation of problematic isolated areas due to: lack of road investment, lack of local equipment, potential for bridge collapse connecting these areas	Transcript R-20 Nehoiu Police Officer Transcript R-13 Insurance agent (ASTRA Insurance Local Branch), R-3 Geologist (Geological Institute of Romania), R-14 Town of Nehoiu Vice Mayor, R-16 Head of Nehoiu Library, R-25 Deputy Director (ISU Buzău), R-20 Nehoiu Police Officer, R-8 Buzău County Sub-Prefect
(3) Strategies pay attention to particularly vulnerable groups (e.g. children, elderly, poor, disabled, populations living in informal and marginal settlements, directly affected, and displaced populations).	Yellow: good example in social support law (Law No. 416) for rubbish cleanup along the river, although conflict with the Romanian Waters Administration inhibits its success Red: vulnerability stressed as function of location along with several issues including: people do not want to move, often not sufficient financial resources for relocation, building still permitted in hazard prone areas, as well as the special case of the Roma population (see footnote)	Transcript R-17 Environmental Inspector and Village Representative Transcript R-18 Head of Nehoiu Emergency Volunteers, R-19 Nehoiu Urban Planner, R-17 Environmental Inspector and Village Representative, R-26 Representative (EPC Private Environmental Consultancy), R-25 Deputy Director (ISU Buzău)
(4) Efforts and measures employed (e.g. for training and education) are impartial, neutral and non-discriminatory as well as gender and culture sensitive, including for vulnerable groups and to those who are not part of established knowledge networks.	Yellow: previously were issues of favoritism, however great improvement with new mayor Red: issues of favoritism at local level (though also good examples – see above) and one example related to the gender from informant who stated, as a woman, difficulties exist in working within the field or risk assessment (e.g. getting access to information)	R-16 Head of Nehoiu Library, R-14 Town of Nehoiu Vice Mayor R-16 Head of Nehoiu Library, R-3 Geologist (Geological Institute of Romania)
(5) The solidarity principle is encouraged within and outside the affected community through strengthening DRR in especially high risk areas. (e.g. using prevention to reduce disparities in protection and ensuring equitable distribution of burdens and impact)	Insufficient evidence to identify patterns or make key point conclusions	Not applicable

Summary of Equity:

1. There was not sufficient evidence to indicate a positive or a negative direction for the traffic light output.

2. Issues arose with who has access to insurance and with the problems that come with trying to address isolated communities, while some good examples were found with the relocation and payment of new homes. Some areas people live in are already determined uninsurable even though it is legally required to have insurance against certain types of hazards through “PAID” insurance (Pool-ul de Asigurare Impotriva Dezastretor Naturale S.A.). According to local authorities, though not everyone has this insurance, it is rare (and lucky for the local authorities) that people who are affected by an event who have no insurance ask for financial help from the Town of Nehoiu. It is well known that there are people living in isolated areas, that these areas (and the people living in them) are particularly vulnerable, and that attention must be paid to these special conditions. However, reasons why isolated areas continue to present problems include: lack of willingness to invest in the conditions of inadequately built roads, lack of all-terrain vehicles at the local level (e.g. vehicles with 4 wheel drive), and potential collapse of the many bridges that connect these areas (as occurred in both the 2004 and 2005 events). One good example with attention paid to vulnerable groups (and finding a solution for this vulnerability) was found in the relocation of people living in vulnerable areas after the events in 2005 to new homes, located in higher, less “dangerous” places.

3. Vulnerability is again implied here to be primarily a function of location. There are several issues presented: 1) people in general do not wish to move from where they live, 2) there are often (contrary to the case in 2005) not sufficient financial resources to relocate them, and 3) building permits are still provided and building is still consequently allowed to occur in unsafe areas. One solution to prevent this vulnerability is to not give any more permits that allow building in these areas; however, people who do not have money cannot afford to build their homes on land that is not exposed to hazards. The local public administration knows that these people are breaking the law (e.g. by building without a proper permit); however, (for example, in the case that someone is in the process of already building their home) they would rather let them finish the process so that they have a place to live, even though it is illegal. The importance here is on the immediate social welfare (having a home and place to live), even though in the long term this can be a very risky and problematic development. A good example was found in efforts to help disadvantaged groups (e.g. with limited income) through a social support law (Law No. 416), in which people can clean up rubbish along the river.⁶ This program is perceived as a positive public

⁶ This is especially important considering the amount of rubbish that accumulates in and along the river and poses potential harm in the case of a flood event.

good; however, there is a conflict with the Romanian Waters Administration as they can and do issue fines because it is considered not under the responsibility of the people but a task of the Waters Administration itself. People are afraid to participate for fear of the fines, as is the Town Hall which can also be fined. A potential suggested solution is improved communication and an understanding with the Romanian Waters Administration.

One other issue is the disadvantaged Roma population, who are not well accepted by the rest of the population tend to live in illegal buildings or live in buildings without any ownership documentation and are, therefore, not under any legal protections.⁷

4. Limited evidence was found for this indicator; however, some issues were present in terms of potential favoritism and gender issues. For favoritism, that differences in how people are affected extend beyond the spatial distribution and includes also political factors such as the relationship with the mayor. An example was given of roads not being improved due to the tension between a local mayor and the president of the County Council who belong to different parties. The result was a negative consequence for the local population who depend upon these roads and are affected by their dilapidation, especially in the case of an event. From statements made by informants at the local level, there were also other examples of issues related to favoritism and otherwise non-neutral behavior from the previous mayor; however, from the comments of key informants, there appears to be great improvement with the current mayor. One example related to the gender component of the indicator was given by a key informant at the “regional” level who communicated that, as a woman, there are difficulties related to getting access to information working within the field or risk assessment.

5. There was unfortunately insufficient evidence to merit a traffic light output for this indicator.

Trust (RO)

With respect to Trust, the research defines this as: **Interactions between and among public and non-public actors occur based on an assurance (and belief) of mutual reliability, including confidence in capacities of authorities, honesty, and integrity.** Important findings indicate there is generally a good level of trust between local authorities and the public as well as specific good examples of trust with selected county

⁷ This is particularly a problem for the Roma population that lives in floodplains of Râmnicu Sărat, an area which houses a large Roma colony. This area is still within Buzau County, however is located at a lower elevation from the town of Nehoiu. Though the area is not directly bounded within the local case study, the researcher deems the issue of importance enough to merit mention for this indicator and for overall issues of equity.

level authorities (although this is not the case for all authorities). Evidence also indicates a good perception of trust between same horizontal level authorities and an improving level of trust amongst all (up to national) levels, although serious issues exist with corruption in assessment procedures and cronyism. Similar to the previous category, issues also exist between local and county level authorities with respect to trust in the local level's initiative to address issues themselves before requesting county level assistance.

Table 10.9: Trust category and indicator traffic light results

Indicator	Traffic Light Output (G/Y/R)	Evidence Base
(1) The public has confidence in the competencies of the local authorities and trusts in the integrity of their activities.	Green: trust perceived (generally) as good between local authorities and the population with good examples found with the trust in the new mayor and confidence in the village representation system (focus of trust understood as good communication from informants) Yellow: acknowledging the above, less trust exists between the population and the higher level authorities	Transcript R-14 Town of Nehoiu Vice Mayor, R-16 Head of Nehoiu Library, R-17 Environmental Inspector and Village Representative Transcript R-14 Town of Nehoiu Vice Mayor, R-21 Nehoiu Shop Owner
(2) The public has confidence in the competencies of the higher level (non-local) authorities and trusts in the integrity of their activities.	Green: strong level of trust for specific higher level authorities exist including the Emergency Situation Inspectorate Buzău and the Red Cross Red: trust between the population and authorities occasionally stymied when people do not know which authority to go to in order to address an issue	Transcript R-25 Deputy Director (ISU Buzău), R-9 Director (Red Cross Buzău) (Additionally: general observation from researcher from preliminary and primary fieldwork) Transcript R-11 Chief of Service, (Environmental Protection Agency)
(3) Authorities within the same horizontal levels feel they can rely on one another and have confidence in each other's abilities.	Green: some perceptions indicating a generally good level of trust between authorities who manage natural hazards on the same level Red: serious issue with corruption and lack of trust in assessment procedures	Transcript R-11 Chief of Service, (Environmental Protection Agency), R-3 Geologist (Geological Institute of Romania) Transcript R-26 Representative (EPC Private Environmental Consultancy), R-3 Geologist (Geological Institute of Romania)
(4) Authorities within different vertical levels feel they can rely on one another and have confidence in each other's abilities.	Yellow: though room for improvement with trust between national and lower levels, trust overall increasing at a slow rate (between authorities) as compared to previously and during the Communist Era Red: issues with cronyism (people in positions for which they do not possess competencies but through connections), lack of trust from higher levels that local level try to manage themselves before immediately calling for help	(General observation from researcher from preliminary and primary fieldwork) Transcript R-8 Buzău County Sub-Prefect, R-27 Geomorphologist (IGRAC), R-26 Representative (EPC Private Environmental Consultancy)

Summary of Trust:

1. Trust is perceived as (generally) good between local authorities and the population. However, there is less trust between the population and the higher level authorities. Trust appears to be understood also as whether there is a good level of communication between different authorities, and between these authorities and the public. At the local level, trust is higher with the new mayor than with the previous mayor, which is attributed to the actions of the mayor and how he demonstrated his abilities in overcoming and managing a fire incident on his first day of office and the good level of communication he has with the people. Trust has also been built at the local level especially given the village representation system. The people in each village are aware of and know their representative (a local) and know that this person will take care of them.

2. Some examples of a strong level of trust for specific higher level authorities exist including the Emergency Situation Inspectorate Buzău and the Red Cross. Overall, (as stated above), the public generally has a stronger level of trust with local as opposed to higher level authorities. However, ISU Buzău is very well trusted and is (according to key informants) to have ranked higher than the church in terms of public trust, although older people tend to have more trust in ISU than younger people.⁸ Outside of these exceptions, trust between the population and authorities is occasionally stymied when people do not know who (which authority) to go to in order to address an issue (such as noise complaints, environmental problems, etc.). If they are sent from one place to another (e.g. go to one place, but then told to go somewhere else with their issue), they lose confidence in authorities. If people have the knowledge (education) of where to go for what issue, this could help foster better trust of the population in the authorities.

3. Evidence suggests a serious issue with corruption and lack of trust in assessment procedures in which competition is restricted in the selection of who (which firms) to work with in conducting assessments based on family relations or friendships. What this means is that assessments can be and are done with very "static" competition in which the quality does not improve over time and remains questionable. There is also evidence toward lack of confidence in the poor quality of many assessment reports and maps created for geotechnical studies and environmental assessments.⁹ Aside from these issues, there are some perceptions indicating a generally good level of trust between authorities who man-

⁸ Again, trust is interpreted in part according to the key informants as a result of good communication and the ability to have good communication.

⁹ Satellite images are used and enlarged to the requested scale. However, this is a poor reflection of the actual (on the ground) situation as, in these cases, no field samples are taken to support the assessments and enlargements are made via zerox.

age natural hazards on the same level.

4. In terms of emergency response, there is an issue with the level of trust between higher and local level authorities. The overall impression from the higher levels is that the local level will immediately call for help before trying to do anything themselves. From overall observation from the interviews with key informants from the County Council, the County Prefect's Office, as well as ISU Buzău and a number of scientific institutions, there appears to also be an issue with trust between the local and national level in addition to issues between the local and regional level. Though there is still substantial room for improvement, trust overall is increasing but at a slow rate (between authorities) as compared to previously and during the Communist Era. A further general critique is that some individuals in higher levels of management have their positions based on their connections during the previous Communist Era (equating to cronyism rather than their personal skill or general competency to hold these positions). This alludes to issues of corruption that still pervade the upper echelons of organizational management in public and private practice. (It was stated that the Office of the Prefect does not have these issues but that there are other places in which this occurs).

Resources (RO)

The category Resources, defined as: **Resources are adequately available and exchanged and enable sufficient and or improved capacity for risk management practices, including both physical (e.g. money, personnel, and equipment) and non-physical (e.g. time, knowledge resources)**, had by far the most evidence out of any of the investigated categories. There were more problems perceived by the key informants here than in any other category, problems which were very closely linked as causal factors (or at least strongly influential factors) for issues identified in other categories (please see connections and conclusions section for further detail).

Table 10.10: Resources category and indicator traffic light results

Indicator	Traffic Light Output (G/Y/R)	Evidence Base
<p>(1) There are adequately available resources including: hazard, risk, vulnerability knowledge; transportation resources; emergency communication resources; personnel; equipment; finances; and time to enable capacity to fulfil tasks for the local level and above.</p>	<p>Green: good practice found in creation of Pătârlagele research station as tool enabling both scientific research, monitoring, and as an educational facility, strong local knowledge as key resource</p> <p>Yellow: some existing resources including evacuation plans and refurbishing of fire hydrant system at local level, some firms with adequate personnel (e.g. BLOM & Geological Institute) at county level, benefit of close proximity to nation's capital and military installations, some resources at county level (Prefect, County Council, and Red Cross), although deficits still exist</p> <p>Red: general lack of resources (especially finances and personnel) across a wide variety of actors including: funding for county plans and local cadastral maps, funding for environmental analysis and risk assessment data, updating emergency equipment and funding to address severe road infrastructure problems, personnel needed for a variety of institutions (e.g. RO Waters Administration & Cadastral Office)</p> <p>General point: lack of resources is substantial capacity inhibitor</p>	<p>Transcript R-27 Geomorphologist (IGRAC)</p> <p>Transcript R-18 Head of Nehoiu Emergency Volunteers, R-2 BLOM private planning and consulting, R-3 Geologist (Geological Institute of Romania), R-8 Buzău County Sub-Prefect, R-9 Director (Red Cross Buzău)</p> <p>(local issues) Transcript R-11 Chief of Service, (Environmental Protection Agency), R-18 Head of Nehoiu Emergency Volunteers, R-19 Nehoiu Urban Planner, R-15 Head of Nehoiu Planning Department, R-14 Town of Nehoiu Vice Mayor, R-16 Head of Nehoiu Library, R-12 Head of Forestry & Administrator (Private Forestry Office Nehoiu), R-20 Nehoiu Police Officer, (county issues) Transcript R-11 Chief of Service, (Environmental Protection Agency), R-23 County Council Chief Architect, R-24 County Cadastral Office, R-8 Buzău County Sub-Prefect, R-9 Director (Red Cross Buzău), R-17 Environmental Inspector and Village Representative, R-27 Geomorphologist (IGRAC), R-26 Representative (EPC Private Environmental Consultancy)</p>
<p>(2) Resources such as equipment, materials, and information are compatible, interoperable and exchanged.</p>	<p>Yellow: current efforts underway to enhance resources to alert the public and the interoperability of exchanges of information and compatibility and existence of maps for urban plans as well as for hazard and risk (though some major challenges for realization exist)</p>	<p>Transcript R-18 Head of Nehoiu Emergency Volunteers, R-25 Deputy Director (ISU Buzău), R-21 Nehoiu Shop Owner, R-22 Architect (SC Proiect Buzău Private Planning Firm), R-23 County Council Chief Architect, R-2 BLOM private planning and consulting</p>

Table 10.10: (continued)

Indicator	Traffic Light Output (G/Y/R)	Evidence Base
(3) An inventory or platform for information exists including information about past events, data sources, best practices and lessons learned in order to assist in the exchange of information between stakeholders.	<p>Green: good platform for data sources and information about past events is the village representation system</p> <p>Yellow: framework for information sharing platform with ISU Buzău, progress for some historical data-based maps from ROSA for emergency management</p> <p>Red: technical platforms (sharing information via online system) needed at county level targeting exchange and sharing of information (e.g. building project, risk and hazard information, past events details)</p>	<p>Transcript R-17 Environmental Inspector and Village Representative</p> <p>Transcript R-4 Romanian Space Agency, R-27 Geomorphologist (IGRAC)</p> <p>Transcript R-23 County Council Chief Architect, R-26 Representative (EPC Private, Environmental Consultancy), R-27 Geomorphologist (IGRAC), R-10 Head of Service (County Prefect's Office)</p>
(4) Resources such as information are affordable.	<p>Red: affordability observed as a key limiting factor across both local and county levels and amongst a wide variety of actors, example given for information available for president for the county committee for emergency situations</p>	<p>Transcript R-10 Head of Service (County Prefect's Office), (Additionally: general observation from researcher from preliminary and primary fieldwork)</p>
(5) Pre-arranged and backup resources exist including emergency funds and pre-committed assets.	<p>Green: good example is found in personal liability insurance for members of commune committee for emergency situations</p> <p>Yellow: some improvement with the financial burdens borne by the county and local levels in terms of the requirement (as of 2010 and 2011) that all people must have insurance</p> <p>Red: issues present with lack of prevention and preparation because funds are meager and normally used for day to day immediate needs (both local and county)</p>	<p>Transcript R-13 Insurance agent (ASTRA Insurance Local Branch)</p> <p>Transcript R-10 Head of Service (County Prefect's Office)</p> <p>Transcript R-10 Head of Service (County Prefect's Office), R-14 Town of Nehoiu Vice Mayor</p>

Summary of Resources:

1. There exists substantial evidence supporting inadequacies in-practice including lack of technical training and skill building at the local level for both emergency managers and planners, especially because local authorities feel a great sense of pressure when they have to intervene because they do not have the technical background. Skills, especially for planning, tend to be self-taught and based largely on local knowledge and intuition (e.g. through local expertise, observation, and practice). Particularly with regard to hazard, risk, and vulnerability knowledge, there is also no capacity to have trained specialists at the local level; and therefore local authorities make use (when possible) of external sources for making geological documentation, environmental assessments, etc. in combination with

local knowledge. There is, overall, a very strong use and importance of local knowledge, which is seen as the primary source of information at the local level. Although, ideally, decisions should be made at the local level because they have the best knowledge of the problems in their community and should not have to wait for information from the county level, lack of resources inhibits this. There is a general lack of logistical and general resources at the local level. Volunteers use their own personal items for intervening as a means to attempt to overcome this deficit. For example, if one has a car, or a couple of shovels, etc., these are used to intervene. Each volunteer is therefore extremely important, especially considering what they personally contribute.¹⁰

Local authorities are looking for funding for the general lack of equipment and material resources through local initiatives, especially because they do not think it will be possible to get funding from the County Council. Local level needs include: informational booklets and leaflets for education and training for the general public (to enable more medium to long term option for informing the population); need for fire engine (closest fire station is 20 minutes away), lack of funds for measures beyond 2005 emergency input from the central government, investments in forest management (there have been no investments in the last 20 years), general lack of four wheel drive vehicles to cover difficult terrain, and general need for basic equipment, additional personnel, and up to date technology. Evacuation plans containing helpful information exist. One improvement, however, is seen in the refurbishing of the hydrant system (enabling all villages to have at least one working fire hydrant).¹¹

At the county level, general lack of resources (especially finances and personnel) across a wide variety of actors restrict activities and influence decision-making. This includes:

- need for financial resources, including larger laboratory for environmental analysis (EPA)
- finances needed to support creating PATG (county level management plan)
- funding to support the work needed for creating and coordinating cadastral maps;
- updated equipment (vehicles and devices) for emergency management for the County Council and County Prefect
- aerial survey of the entire territory to address severe road infrastructure problems;

¹⁰ In an example of this in the case of a recent fire, volunteers took brooms and backpacks filled with water bottles to the location of the fire.

¹¹ At the time of the interviews, in Nehoiu there were only a few that were functional. The system is being replaced (construction was visible during the field visit). There will also be a map to show where these are as currently there is no such map.

- greater financial support for NGOs (e.g. Red Cross) from the national level for adequate personnel, donation deposit sites, vehicles
- personnel and funds needed for the Romanian Waters Administration to keep the valleys and rivers clean and clear of debris
- and finances for assessment completion and need for data (e.g. climate data and aerial images) for research institutions

Efforts to overcome the above include going into the field to gather currently unavailable data and outsourcing to external firms or institutions for assessment.¹² Some resources are available including: one helicopter¹³ and also adequate personnel for the County Council and Prefect, four wheel drive vehicles, and powerful radio stations for communication in mountain areas (although there are still “white spots” where no communication is possible). The county also benefits from being in close proximity to the national capital (Bucharest) and major military installations in Buzău.¹⁴ The Red Cross also has some resources including: K9 search and rescue¹⁵, resources for psychological counselling for those affected in emergency events (through partnership with the Association of Psychologists in Buzău County), a supplementary insurance for its employees (provided by national level funds), and a water training facility. They are also working toward building an interoperational center (20 modular buildings (large containers) that function as a training facility and place for information exchange). One good practice for resources is the creation of the Pătârlagele research station as a tool enabling both scientific research, monitoring, and as an educational facility. Some firms (e.g. BLOM and Geological Institute of Romania) do have adequate personnel.

2. A few examples were found in the following: resources to alert the public and the interoperability of exchanges of information, and compatibility and existence of maps for urban plans as well as for hazard and risk. To the first point, SMS alerts were under discussion as a potentially helpful resource to reach all parts of the territory, as this may be a better alternative to posters (e.g. information transmitted via poster is very slow and printed resources are limited) and help reach people not within range of the siren alert.¹⁶ The key issue is whether or not to have these emergency alerts sent directly to all members of the

¹² E.g. the Cadastral Office can try to use orthographic photos or soil studies completed by an external institution.

¹³ There is only one helicopter per development region (they prefer to have one per county).

¹⁴ They are more able to address their issues directly with the authorities in Bucharest and able to use (in the case of an event that requires military involvement) the resources of the army, including also satellites and satellite communication.

¹⁵ K9 refers to dogs specifically trained and employed for search and rescue operations.

¹⁶ At the individual level, some people also rely on their own information and experiences, some people do not necessarily know where to go to get more information. Some additional alert system like SMS would also be helpful as the siren has a limited range of sound from the town.

public or to organize this at the local level in the way that ISU sends the alerts via SMS to the mayors and the vice-mayors and these individuals relay this message. For urban plans, Nehoiu does not have money to update or digitalize the map of the PUG (lack of finances prevents many towns from having this),¹⁷ although in 2003 there was an initiative at the county level to update and improve the quality of the PUGs which would make the work of the county easier (would be a better form for them to use). For risk and hazard maps for landslides, projects for these maps were started at the county level but not completed due to lack of funds, especially as they will also need single maps for hazard, susceptibility, exposure and vulnerability.

3. A good platform for data sources and information about past events is the village representation system, connecting information (e.g. social and physical-geographical) and between the smaller villages and the Nehoiu Town Hall, including the committee of emergency situations and the planning office. Technical platforms (sharing information via on-line system) are needed at the county level, especially targeting: systematic organization of information building projects (information about surrounding area, current problems, existing projects, etc.); exchange of information with other authorities but also developers, consultants, the broader public and NGOs; information about consequences of events from all communes to county level; and existing information about risks and hazards, especially that exists but is not public. There is a conceptual framework that exists for how they would want to do this but not a software that is developed and can be used (e.g. with ISU they have the background information but need the proper technical support). Furthermore, the institution that would coordinate this, should be removed from political circles in order to allow for more long term activities that extend beyond four years (the typical term of office for an elected official). Some progress in this respect exists for information for emergency response and security provided by the Space Agency (ROSA) through maps that can be produced with the extent of the affected area for given historical disasters (using historical data).

4. In general, affordability in terms of available finances to purchase resources has been observed as a key limiting factor across both local and county levels and amongst a wide variety of actors. One specific issue at the county level highlighting this point is that the president for the county committee for emergency situations is supposed to have all data, infrastructure, money, personnel, and knowledge to perform their actions and apply management plans. However, this does not happen in practice because they do not have sufficient resources, especially not sufficient financial resources. This also impacts ability to address pressing issues not within legal mandate. The county level authorities are aware

¹⁷ Most of these plans are very old and were created in the 70s and 80s. They have since then not been updated as it is much cheaper to keep the old maps than to update them

that there are climatic changes (and changes in the weather) and that this is leading to enhancing natural hazards and consequently risks and their impacts. Though they want to address this, the issue of lack of funds still limits what they can do.

5. A good example is found in personal liability insurance that exists for members of the Commune Committee for Emergency Situations, which is paid for by the city hall (also required state law). People without insurance can get assistance from the town hall if they are affected by an event. If the town hall does not have the resources, then they can ask the County Council (good that this is very rare). However, issues are present with lack of prevention and preparation because of lack of funding.¹⁸ In Nehoiu resources for the budget for emergency situations (based on past events) is 20,000 euros (for intervention), which is not a large sum and is not legally required. The local level budgets (for communes and municipalities) are legally required to provide for all phases of disaster risk reduction, including prevention and recovery. However, the funds are meager and normally are used for the day to day immediate needs they are normally lacking like phones, replacing bad tires, batteries, and gas.

These issues exist also at the county level, which is important because both (local and county) levels need to provide funds for people who have lost their homes in past flood and landslide events (e.g. as in 2005 and 2006). There is, however, some improvement with the financial burdens borne by the county and local levels in terms of the requirement (as of 2010 and 2011) that all people must have insurance. This helps the administrative authorities in case they must provide funds for houses that were affected.

Coordination (RO)

Evidence for Coordination, defined as: **Formal (legally required) tasks and interactions between multiple stakeholders (including the public) within different sectors and levels run smoothly and are positively perceived**, revealed good examples in the transfer of information between levels, and (mostly) positive practice experiences in coordination amongst actors in the same horizontal levels. However, some negative examples emerge, again reiterating similar issues with the “inaction” issue presented in the Efficiency category, and limitations to coordinative capacities due to lack of resources.

¹⁸ For the funding they have at the local level they are legally required to have between 10,000 to 10 million euros for social assistance and emergency situations. But this is really only for intervention (response and recovery). This includes money for funerals, medicine, supplies for people who are affected; but it is not a large sum of money.

Table 10.11: Coordination category and indicator traffic light results

Indicator	Traffic Light Output (G/Y/R)	Evidence Base
<p>(1) Coordination is perceived as effective for managing equipment, training, procedures, planning, emergency care and support, and outside assistance.</p>	<p>Green: coordination runs smoothly at the local level (esp. with mayor), good coordination also for emergency management amongst specific key county level actors Red: similar to efficiency category, issue of local level inaction for emergency response and need for better understanding between local and county levels to help remedy this, also some issues between emergency aid NGO and county administration (e.g. facility organization)</p>	<p>Transcript R-16 Head of Nehoiu Library, R-24 County Cadastral Office Transcript R-17 Environmental Inspector and Village Representative, R-25 Deputy Director (ISU Buzău), R-27 Geomorphologist (IGRAC), R-9 Director (Red Cross Buzău), R-10 Head of Service (County Prefect’s Office)</p>
<p>(2) Coordination occurs among stakeholders at all levels through a bottom-up approach, starting with the needs of the local up to the higher levels.</p>	<p>Green: Overall good transfer of information from the local to the regional level, e.g. also supported by village representation system Yellow: local autonomy enables power to local level, encouraging bottom up approach, however issues with funding limitations inhibiting local capacity (see red below) Red: lack of funds impacts ability of local level to include risk prevention in planning and impacts county level ability to assist this</p>	<p>Transcript R-11 Chief of Service, (Environmental Protection Agency), R-17 Environmental Inspector and Village Representative Transcript R-10 Head of Service (County Prefect’s Office), R-12 Head of Forestry & Administrator (Private Forestry Office Nehoiu) Transcript R-10 Head of Service (County Prefect’s Office)</p>
<p>(3) A communicative link established between different stakeholders for transferring of information, linking emergency and planning authorities, linking different decision-makers, linking civil protection and environmental services, and allowing for exchange of best practices.</p>	<p>Green: good examples with communication of a wide variety of stakeholders in both local level and county level emergency committees as well as between local and county level Yellow: enhanced communication between scientific institutions and emergency management (the General ISU in Bucharest) to create a landslide risk assessment throughout Romania, encouraging involvement of a range of institutions</p>	<p>Transcript R-13 Insurance agent (ASTRA Insurance Local Branch), R-14 Town of Nehoiu Vice Mayor, R-18 Head of Nehoiu Emergency Volunteers, R-17 Environmental Inspector and Village Representative, R-20 Nehoiu Police Officer, R-23 County Council Chief Architect, R-24 County Cadastral Office, R-25 Deputy Director (ISU Buzău) Transcript R-27 Geomorphologist (IGRAC)</p>

Table 10.11: (continued)

Indicator	Traffic Light Output (G/Y/R)	Evidence Base
(4) There is perceived to be a good level of coordination within horizontal and between different vertical levels as well as across sectors.	Green: generally same horizontal level coordination works well at local level, and in transmitting information to higher levels, examples of similarly positive coordination amongst county level institutions Red: Problems with following well-stated legal guidelines for coordination in-practice due to lack of funds and education, issue between specific institutions expressed, lack of resources to fulfil expectations can and has negatively affected coordination between levels	Transcript R-18 Head of Nehoiu Emergency Volunteers, R-22 Architect (SC Proiect Buzău Private Planning Firm), R-23 County Council Chief Architect Transcript R-11 Chief of Service, (Environmental Protection Agency), R-12 Head of Forestry & Administrator (Private Forestry Office Nehoiu)
(5) Coordinated efforts support a harmonized, holistic approach to DRR using common measures, response language, standards and protocols.	Green: Local level communication protocol is well established, good harmonization example of merge of firemen and civil protection	Transcript R-14 Town of Nehoiu Vice Mayor, R-10 Head of Service (County Prefect's Office) (Additionally: from preliminary fieldwork meeting with ISU Buzău)

Summary of Coordination:

1. Decision making at the local level seems to run quite smoothly, especially on the part of the mayor, enabling flexibility to work well together at this level with good organization. For coordination between local and county levels, local level inaction is an issue (as presented in the efficiency category) especially in the case of emergency management. For the same reasons presented in the efficiency category, there is a mismatch of expectations between the local and the county level in terms of intervention actions (the county level expects; but it does not trust that the local level will attempt to manage within their own means prior to relying on the county level; while the local level will state they have tried; and further that they are volunteers with limited resources). This has been communicated by at least one informant as a need for better understanding between the two levels in order to improve coordination. Coordination appears to work well amongst ISU Buzău, the Prefect, and the Cadastral Office; however, there appear to be some issues between the Red Cross and the county administrative authorities (issue in terms of desire for more support and specifically for a headquarters and donation depot).

2. Overall, the transfer of information from the local to the regional level is good. The general notion, however, is that everything should start with the local level (where the local knowledge is), which is also assisted by the village representation system. Another

example is "local autonomy" that is built into the legal framework governing powers of different administrative levels (meaning the local level has its own decision-making powers). This is specifically seen, for example, in planning documents and information: the county level gathers and accepts all PUGs given by the local level (communes) in order to make the county level zonal plan. This is considered to be a bottom up approach and is required under the mandate of local autonomy. The county level provides guidelines and can offer technical assistance. An in-practice issue arises out of land use planning and risk prevention at the local level. What is stated from the county level is that land use planning used for prevention is something that should be considered and done within the general urban plan (so that this is then also accounted for within the county territorial management plan). A county level representative reiterated that the local level again calls for support immediately from the county level; however, funds are lacking at both levels (local and county). There is a need for funding to come from the national level to the county and local level.

3. Good example of "new" coordination between insurance agencies, the local population, and the Commune Committee for Emergency Situations: for an affected person to claim damages the Commune Committee for Emergency Situations must state that there was a disaster, the insurance company then checks with the committee and they go into the field together to assess damages with ISU and make a report. This report is sent to the central insurance bureau. ISU verifies the event and provides the official report of the event, damage is established together with ISU and the commune committee and are calculated by the insurance inspector. In the case that there are damages that require allocation of funds from the county, the County Council is also given information on the damages and recovery. In general, the commune regularly provides information about events to the prefecture and to ISU and there is overall a good level communication between ISU and the local committee for emergency situations.

There is also a good level of communication between authorities and a strong connection between emergency management and planning through the information gathered and shared for the commune committee for emergency situations. The village representatives who report information on their particular village for this committee also provide information for the planning department. Through this connection, urban planners also have information about an area and what it is prone to (courtesy of information provided from the committee for emergency situations) and will be able to use this information when going to the field to determine if a building permission can be given. A good communicative link between planning and emergency management authorities is also found at the county level through the county committee for emergency situations, which similarly links the County Council's Chief Architect's Office, the Cadastral Office, and emergency management (including ISU

and Prefecture). Expertise and advice is exchanged and local authorities are also consulted.

Coordination is also being enhanced in communication between scientific institutions and emergency management (the General ISU in Bucharest) to create a landslide risk assessment throughout Romania, and encourage involvement of a range of institutions (e.g. the National Meteorological Administration, the National Hydrological Institute, among others).

4. The legal provision for coordination between higher levels and the local levels is well stated and provides good guidelines. However, in practice there are problems with following these guidelines due to lack of funds and education. Within the same horizontal level, coordination between authorities at the local level works generally well, though it depends on who is involved and the phenomena at hand. However, there is a negatively perceived relationship between the local forestry agencies and the Environmental Guard (told from the viewpoint of the forestry agency). The Guard is stated here as collecting fines, but not providing support on the field which they are also legally required to do (to work together and go to the field). The obligated transmission of information they are required to send in the case of fire, landslide, flood, or any other kind of event coordination with higher authorities works well (especially between emergency volunteers and ISU).

At county level, coordination with planning firms (e.g. the S.C. Project Buzău planning firm) and water authorities and geologists that make the technical studies works well; because they are legally required to work together and through this they maintain a good dialogue in trying to fulfill requirements. This is also perceived as good with the lower level authorities. This is similarly seen for coordination between the Chief Architect's Office at the County Council and the local level. The same is said for communication between this office and higher levels (not limited to only coordination).

In general, the issue of expectations from the county to the local level and lack of resources to fulfill those expectations can and has negatively affected coordination between levels (similar to issue of local inaction presented in Efficiency category).

5. The communication protocol is well established at the local level; the vice-mayor (or in some other communes, the mayor) is the primary contact point for any emergency (112) calls.¹⁹ A team of ten people is formed for the committee for emergency situations. They go to the site of the event, determine whether they can manage the event with their own

¹⁹ In the case the vice-mayor is not available, this would be the secretary; and if something happens to the secretary, then this is the head of the commune emergency volunteer services.

resources, or if they must ask for help from the county level.

One clear example of harmonization was given as follows: There was a change in the structural organization of emergency management authorities in which the civil protection and the firemen (previously separate institutions) were merge together and created the Inspectorate for Emergency Situations. This was at first a rough process in accepting one another, but now this system works well.

Cooperation (RO)

In consideration of the evidence for Cooperation, defined as **Informal (not legally required) tasks and interactions between multiple stakeholders (including the public) within different sectors and levels run smoothly and are positively perceived**, good communication between (vertical) and among (horizontal) levels tended to refer to the understanding of “good” cooperation according to the key informants. Generally, perceptions were positive for cooperation amongst authorities and institutions (also across sectors) at local and county levels and across these levels, with some exceptions and outside of the issue of funding and re-education for newly elected officials. Evidence suggests strong local connections, especially with the population, but weaker connection between the population and county authorities. Some good examples of volunteering and training exist; however, improvement can still be made in these efforts.

Table 10.12: Cooperation category and indicator traffic light results

Indicator	Traffic Light Output (G/Y/R)	Evidence Base
(1) The informal tasks and interactions are positively perceived within and between all levels.	<p>Green: generally positive perception of cooperation amongst authorities at local, county, and between the two levels (especially in terms of good communication as a main point, and even helpful in overcoming resource deficits at local level)</p> <p>Yellow: although generally good perception of cooperation between local and county levels, still issues with respect to funding</p> <p>Red: examples of improvement needed for understanding between local authorities and Romanian Waters Administration, consulting firms and meteorological administration, potential tensions between levels if difference between political preference, potential favoritism in planning initial application processes</p>	<p>Transcript R-11 Chief of Service, (Environmental Protection Agency), R-17 Environmental Inspector and Village Representative, R-8 Buzău County Sub-Prefect</p> <p>Transcript R-17 Environmental Inspector and Village Representative</p> <p>Transcript R-17 Environmental Inspector and Village Representative, R-26 Representative (EPC Private Environmental Consultancy), R-27 Geomorphologist (IGRAC), R-2 BLOM private planning and consulting</p>

Table 10.12: (continued)

Indicator	Traffic Light Output (G/Y/R)	Evidence Base
(2) Informal tasks and interactions are positively perceived within the local level and especially with interactions involving the public.	Green: strong local networks and volunteer system, greatly improved cooperation between population and local authorities due to new leadership Yellow: not much collaboration between the local population and the regional level authorities (reason that population instructed to go first to local before county level), solution suggested in having more meetings and discussion	Transcript R-13 Insurance agent (ASTRA Insurance Local Branch), R-14 Town of Nehoiu Vice Mayor, R-16 Head of Nehoiu Library Transcript R-16 Head of Nehoiu Library
(3) Informal interactions exist between those who are practitioners, policy makers, and scientific researchers as well as across sectors, especially between planners and emergency management authorities.	Green: some positive examples with cooperation between urban planners and emergency management, and between scientific institutions and emergency management Yellow: variation in the existence of informal interaction between different private planning firms and other institutions Red: issue in interinstitutional cooperation with re-education process of newly elected officials, suggestion of longer terms as solution	Transcript R-19 Nehoiu Urban Planner, R-24 County Cadastral Office, R-27 Geomorphologist (IGRAC) Transcript R-22 Architect (SC Proiect Buzău Private Planning Firm), R-2 BLOM private planning and consulting Transcript R-25 Deputy Director (ISU Buzău), R-10 Head of Service (County Prefect's Office)
(4) Non-formal structures exist in terms of exchange of information between vertical levels especially for exchange of best practices.	Yellow: Meetings among ISU Buzău with county authorities and others have constructive dialogue, however still issue of "organizing poverty" (individualist prioritization of resources)	Transcript R-25 Deputy Director (ISU Buzău)
(5) Informal tasks and interactions are perceived as positive for research, training, education, and volunteer activities. (also from interview transcripts)	Green: Good examples found via volunteering and clean-up days with students at local level and with Red Cross training operations and training days with high schools Yellow: efforts for teaching and training provided by ISU Buzău, however uptake for this with respect to prevention activities low, assumption of responsibility for trainings placed largely on ISU Buzău	Transcript R-20 Nehoiu Police Officer, R-8 Buzău County Sub-Prefect Transcript R-25 Deputy Director (ISU Buzău), R-9 Director (Red Cross Buzău)

Summary of Cooperation:

1. Generally good cooperation between institutions at the county level. This is the general perception for a number of institutions including the EPA, the Prefecture, and ISU Buzău. This is the same as the local level (generally positive perception of good cooperation amongst authorities). Good cooperation also in this respect, and particularly good

communication, helps to overcome issues with lack of resources at the local level in efforts to intervene in a given event. Cooperation (again in terms of communication) is considered good between the county and the local level (according to both levels), although problems are encountered with funding issues. There are also, however, examples in which cooperation needs improvement including: cooperation and building understanding between the Romanian Waters Administration and the local administration with respect to the social help and river maintenance; more open cooperation potentially needed between consulting firms and the meteorological survey; potential (occasional) tension between county and local levels when authorities are from different political parties; potential favoritism in granting approvals for planning initiatives at the county level depending on the applicant.

2. At the local level cooperation is supported by the close, and very strong social networks (e.g. everyone knows everyone). Volunteer system works well at the local level. The 2005 event provides a good example of local volunteerism (e.g. people took to filling sandbags and trying to use these to stabilize the banks of the river that were collapsing). Cooperation has improved between the population and the local authorities due to the openness of the new mayor (e.g. more discussion has been encouraged since his election to office).²⁰ Cooperation is improved because the new leader listens to people and gets involved personally in the recovery efforts. He is described as not just giving orders, and it is further described that they are "dealing with a leader instead of a ruler". There is not much collaboration between the local population and the county level authorities and is stated as due to the following: the population can receive information, exchange, and discuss issues with the local authorities, and they expect that they should not to go directly to the regional (county) level because they will receive a negative answer and will be instructed to go through the local level authorities. A potential solution for improving cooperation is more meetings and discussions organized by the mayor in which, for example, owners of pastures are invited and people from ISU can explain good practices for sustainable activities.

3. An example was given of cooperation between urban planners and emergency management; for example, in terms of accessibility and especially road access for large vehicles, in which technical information regarding the passability and size of the roads is given by the planners to the emergency authorities (e.g. ISU). Efforts are also made by county offices (e.g. Cadastral Office) to try to collaborate with a range of institutes. There appears to be very good cooperation between scientific experts and ISU and potential for expanding

²⁰ Previously, there was only one-directional communication and no discussion on the deforestation issues people knew affected the landslides and flashfloods. This was stated as due to also personal interests of the former mayor. Now issues that are important to the population can be discussed and addressed.

this, (e.g. good example given in ISU providing support for collection of landslide data).²¹ Some private planning firms have information interactions with other institutions, others not especially in connection to emergency management. One issue in interinstitutional cooperation is the re-education process every four years with newly elected officials. To help foster greater cooperation and to help encourage a more medium to long term focus, there should be people within the county institutions that remain there for more than four or five years.

4. Meetings with county authorities and others tend to have constructive dialogue in which ideas for change are discussed together; however, the issue is how to implement change especially given the common perception that "[t]his is a matter of organizing poverty", in which with such limited resources, each institution tries to prioritize their own resources for themselves.

5. Good examples are found via volunteering and clean-up days with students, from which local level authorities have seen improvements in education. Cooperation in terms of encouraging activities for prevention is a focus of a particular department within ISU, which tries each year to work with communes to implement prevention measures; but the response to partake in these activities is low. The County Prefect's Office states that they are not directly involved with the public in terms of communication (e.g. trainings and awareness building) as it is understood that ISU is responsible for all of this including all preparedness efforts and teaching facilities. A good example of cooperation with the public is also found with the Buzău Red Cross and their safety training days with high schools (gives example of training with all high schools in Buzau that they did for first aid), and volunteer system (e.g. there are 400 volunteers total for Buzau county, and 15 of which are on 24/7 call and trained for intervention).

Risk Culture (RO)

In light of the definition: **Strategies work toward a “culture of safety” translating to outcomes including a high level of risk awareness, a focus on prevention, consideration of the needs and priorities of the local level, and encouragement and empowerment of local level self-initiated actions to enhance capacity for DRR**, evidence for this category yielded dichotomies of self-recovery versus no self-recovery in terms of individual self-initiative taking in addition to a reiteration of overreliance on

²¹ The team of experts from the Institute of Geography went out to communes to gather data and ISU would ensure that the communes were informed and ready for the experts. With this support, the team was able to gather landslide data for 100 percent of the communes they needed to visit. This is a result of a good relationship between the two and an understanding of the importance of the collection of this data (e.g. alignment of priorities).

the county level (by county authorities). Also revealed was a general need for increasing education to raise awareness but also the need to combine and complement this to currently pressing issues in the community. Several barriers to enabling a focus on prevention were present as well as a generally perceived low priority placed on prevention and risks in general. Some good examples of informational campaigns to enhance capacity while still protecting livelihoods exist, while a key point was made that a required change that prohibits livelihood activities cannot be made unless an alternative solution is also provided.

Table 10.13: Risk Culture category and indicator traffic light results

Indicator	Traffic Light Output (G/Y/R)	Evidence Base
(1) The local level and especially the population is empowered and encouraged to be informed and to take self-initiated actions (e.g. insurance).	Yellow: dichotomies of two types of people, some who self-recover and others not, also dichotomy with uptake of insurance in which lack of uptake attributed to preference on self-protection via local knowledge and connection to place Red: from county level, reiteration of overreliance on county level, lack of volunteering, civic responsibility, and individual public actions (though not applicable to all people), and need for education especially for behavioral change (some association made to influence of Communist Era mindset)	Transcript R-13 Insurance agent (ASTRA Insurance Local Branch), R-16 Head of Nehoiu Library Transcript R-22 Architect (SC Proiect Buzău Private Planning Firm), R-25 Deputy Director (ISU Buzău), R-27 Geomorphologist (IGRAC), R-10 Head of Service (County Prefect's Office)
(2) The population is well-informed and has a high level of awareness (e.g. also through role of media). (also from interview transcripts)	Yellow: increase in awareness of changes in the weather and effects to daily life; solutions suggested for increasing education and awareness through expert input at local level but must find complementarity with other local problems Red: direct need for education, especially in rural areas regarding understanding phenomena and how individual actions increase risk	Transcript R-17 Environmental Inspector and Village Representative, R-27 Geomorphologist (IGRAC) Transcript R-11 Chief of Service, (Environmental Protection Agency), R-22 Architect (SC Proiect Buzău Private Planning Firm), R-16 Head of Nehoiu Library

Table 10.13: (continued)

Indicator	Traffic Light Output (G/Y/R)	Evidence Base
(3) Strategies employed encourage a focus on prevention and emphasis on “pre-disaster activities” (also from interview transcripts).	Yellow: starting to take future changes into account and efforts to encourage prevention from county level authorities (although local level response low), some examples in legal frameworks and practices for safety coefficients, buffer zones, more cautious return periods beyond EU requirements, and in some cases rejection of projects not conforming to assessment requirements Red: barriers for preventative focus include higher, more immediate priorities, limited (especially local) budget, post-Communist Era loss of individual initiatives taken for the public good, and need for longer terms of office for elected officials to enable continuity of issues	Transcript R-18 Head of Nehoiu Emergency Volunteers, R-22 Architect (SC Proiect Buzău Private Planning Firm), R-23 County Council Chief Architect, R-26 Representative (EPC Private Environmental Consultancy), R-27 Geomorphologist (IGRAC), R-2 BLOM private planning and consulting, R-25 Deputy Director (ISU Buzău) Transcript R-14 Town of Nehoiu Vice Mayor, R-10 Head of Service (County Prefect's Office)
(4) Strategies pursue solutions that take into consideration the characteristics, needs, and priorities of the local level (especially of high risk areas).	Red: generally strategies take consideration of needs and priorities of the local level, but to the detriment of potential consideration of hazards and risks within these priorities resulting in negative consequences (e.g. illegal constructions)	Transcript R-16 Head of Nehoiu Library, R-21 Nehoiu Shop Owner, R-22 Architect (SC Proiect Buzău Private Planning Firm), R-26 Representative (EPC Private Environmental Consultancy), R-2 BLOM private planning and consulting, R-10 Head of Service (County Prefect's Office)
(5) Efforts are taken to protect livelihoods through the provision of information on individual actions that can be taken, as well as community based local level activities (e.g. training, drills, volunteering) to enhance local capacities.	Green: good examples of attempts to strengthen capacity (while considering livelihoods) through educational campaigns with children Red: issue that long standing traditional activities (for maintaining livelihood) should not be prohibited without provision of alternative solutions	Transcript R-20 Nehoiu Police Officer, R-27 Geomorphologist (IGRAC) Transcript R-2 BLOM private planning and consulting

Summary of Risk Culture:

1. Regarding uptake of the legally required insurance coverage, the town hall checks if people have paid their insurance (about 60% of the population in Nehoiu has the compulsory insurance); and if they haven't, they can be fined but the prefecture does not enforce this. Money (or lack of) is actually stated as not the reason why some people do not have this insurance.²² There appears to be a tendency that those who have the policies, tend

²² This percentage was provided by the local ASTRA Insurance agent in Nehoiu as of 2013.

to have the policies that offer the larger coverage and are more expensive; while those who do not have policies state that they know how to protect themselves, especially in the case they have lived in the same place for a long time, and therefore do not need the insurance.

There is a variation in the perception of whether people at the local level take self-initiated action. In describing the case of the event in 2005, one informant described two types of people that become visible after the situation becomes more calm (group 1 = no self-recovery, group 2 = self-recovery). One group meticulously adds up every detail of damage and goes to the town hall to ask for reimbursement and to complain, as well as insist they will not take any further actions and are often people who are not originally from the area. The second group of people try to recover themselves without involving the town hall, using their own means as they have done for generations. These people are typically born here and have been living here for a long time, and are described as "hard working people who know the value of their own properties..." and who have built up their property within their own capabilities and means.²³ In contrast and in connection to the first group type, in some cases people have a feeling of being "poor and lost", a perception connected to the further statement that lack of money drives some (though not all) people to behave in a way that they try to gain some profit for themselves by, for example, causing further damage to their own properties in order to get more financial help.²⁴ From the county level, it was reiterated that there is not a strong sense of volunteering and a lack of civic responsibility. Barriers to public action and involvement appear to be lack of education and encouraging behavioral change which overlaps with poverty, especially in rural areas. The communicated result is that people feel they have more important issues than the environment, volunteering, and fulfilling civic duties, equating to a lack of self-initiated actions at the local level and greater pressure on key county level actors who are perceived as being responsible for everything. This was also stated as being potentially attributable to a post-Communist Era mindset, in which people tended to wait for someone else to solve their problems and were not concerned about minding a task well because in the previous communist system someone else will also be looking at or performing the same task (e.g. stated as contributing to a destroyed personal responsibility).

²³ It was stated that a greater majority of people fall within the second group. This group feels they have the responsibility to recover themselves, especially because they have worked hard for their belongings and are willing to solve their own problems (e.g. some people take additional preventative measures through additional insurance, or enhancing the resistance of their properties by building walls, fences, drainage channels, etc.). (See Transcript R-16 Head of Nehoiu Library for quote).

²⁴ The thought process behind this is that even those who are not as greatly affected are also poor or just as poor as those who are effected and believe that they can and should also benefit from recovery efforts.

2. In general at the local level, people are aware that the changes they are seeing in the weather are not normal and are becoming more and more aware that these changes (also in reference to climate change) can effect land use and their daily life. However, often reiterated is the need for education to increase awareness for example for sustainable practices, knowledge about natural phenomena, and how personal actions can affect potential flood risk, especially in rural areas. In these areas there is a strong attachment and history of the people and their families to the land, in which the practices and knowledge of previous generations are passed down from generation to generation without consideration of a changing environment, current environmental problems, and where people should and should not build. Many people think of catastrophes as the will of God, and many people do not understand that their own individual actions can influence processes triggering hazards.²⁵ Suggestions were made in that an educational and explanation-based input from experts to understand phenomena and change could be helpful and is a good idea; however, this if put in practice, must not conflict and should rather support and draw connection to the longer list of more immediate problems at the local level.

3. Some specific examples were given indicating attention to prevention and pre-disaster activities including: legally required buffer zones along the river; use of probabilities extending above and beyond that which is required by the EU Flood Risk Directive as well as safety coefficients used in calculating resistance for projects within private planning firms; and disapproval of projects from the Romanian Waters Administration which do not concur with requirements for flood and landslide assessments. At the county level, they would also like to take future changes into account with their actions and programs, although this is just in a beginning phase.

Though efforts are made by ISU to encourage focus on preventative actions and discussion, there is a very minimal response from the local level. Reasons given for this include: higher priorities than the topic of prevention and consideration for hazards and risks, including unemployment as a top concern, among other economically induced social problems; loss of individual initiatives taken for the public good immediately after the fall of the Communist Era; limited local budgets for disaster management equating to focus solely on response and more immediate issues; and the need for longer terms of office for elected officials to enable continuity of issues beyond the four to five years in which people are elected.

4. In general, strategies tend to take consideration of needs and priorities of the local level but do this, however, to the detriment of potential consideration of hazards and risks within these priorities. Hazards and risks would (perhaps) fall within the middle of the list

²⁵ For example, people will want to irrigate their land but will not realize that they are saturating a slope with water and that this can be a problem.

of priorities after unemployment and issues regarding the quality of infrastructure such as roads, water supply, drainage and sewage. Floods and landslides also tend to fall behind earthquakes in terms of the importance of different hazard types. Both local and county level informants stated that these hazards are not as important as they should be, due to more immediate, practical problems at hand such as unemployment and aging populations. They are also not as well developed or more readily addressed by the authorities as biodiversity issues (e.g. the authorities know what Natura 2000 is). Results of this issue can be seen in approval of construction permits that normally should never be approved, such as construction of dwellings in areas right next to the river.

5. Some examples were found in attempting to build local capacity through educational campaigns including environmental education with children at the local level (including through the Pătârlagele research station). This may act as a conduit of knowledge transfer and interest into the household level in light of the other pressing problems adults are acutely aware of, including the continuation of livelihoods in the first place. One take away point related to consideration of livelihoods and place specificity is that if strategies target a change in local practices or maintenance of livelihoods, an alternative practice must be suggested. For example, some areas of the high mountains have no electricity and one cannot simply tell inhabitants that they cannot burn firewood from the forest. Alternative solutions must be (but in some cases are not) offered. It is not a solution to simply prohibit a long standing traditional activity and charge people fines if they continue these activities without offering some sort of alternative.

10.3 Connection mapping and explanation

The evidence base used for the traffic light outcome was also used to create a map of connections between categories (see Figure 10.1 for map). The most connected appeared to be Effectiveness, Resources, Risk Culture, and Cooperation. Openness & Transparency as well to Coordination and Trust appeared to have some significant connections, while Equity, Efficiency, Accountability as well as Participation and Strategic Vision appeared to have fewer. The results of this mapping echo some of the key points found in the previous sections. One can note, for example, that in the Romanian case of the Nehoiu catchment that Resources is strongly connected to a number of different categories. One of the many instances of this is found in the strong connection between Resources and Effectiveness (see connection number nine for examples). However, one of the strongest examples is found between Resources and Efficiency. Resources demonstrates a very strong inhibitive connection, in which one cannot even get to the dialogue of Efficiency before going through Resources and the issues thereof.

With regard to **Openness & Transparency**, one can see a connection in terms of availability of information and the ability to participate found in connection number two. This is arguably similar to the connection number three, connected to resources, in which a lack of available and to access information inhibits the ability to work with risk.

For **Participation**, the use of local knowledge for individual decision-making (part of Indicator 4 for participation) is connected to Openness & Transparency in terms of remedying inadequate information (part of Indicator 4 for Openness & Transparency) and is similarly connected to Resources in general in terms of using local knowledge when other resources do not exist. This particular point is observed to be a very important issue and local knowledge a very important source of information within this case study.

A strong point for **Strategic Vision** also involved connection to Resources in which the lack of resources (similarly to Efficiency) serves as an inhibitor, and limits whether or not local authorities think they can plan for or have a vision in the long-term.

For **Effectiveness** specifically Indicator 5 appeared to have connection to many different categories. The connection and indicator specifically targets issues related to the rule of law and the fulfillment of regulations in practice. Many examples were given in connection to resources and how general lack of funds affects abilities to fulfill requirements while other points are related to being able to function given limited resources and the example of law not respected and producing substantial illegal building immediately after the Revolution in 1989.

As aforementioned **Efficiency** was very strongly connected, and inhibited by Resources affecting the most appropriate level of decision-making as well as the amount of time needed to complete tasks.

Within **Trust**, a positive connection to Coordination was found with the village representation system that has built trust over time. However, a negative connection to Coordination is also found with a lack of trust from county authorities in the abilities and self-initiative of the local level.

Resources features many connections to other categories, particularly from Indicator 1 in terms of lack of resources; specifically financial, equipment, and personnel and also connecting to the issue of isolated communities. Key points were made with connections from this category including the notion that the current situation is like trying to “organize poverty” (see number 26).

Cooperation appeared to have a positive connection with Trust in terms of communication structures at the local level (e.g. the village representation system).

For **Risk Culture**, the connection to coordination highlighted a key issue within this case study; namely, a strongly perceived lack of civic responsibility and self-initiation in actions from the local population. Other connections were found with Indicator 2 of Risk Culture (targeting awareness and knowledge) and identified issues such as the lack of accumulation of know-how but also a positive component with the passing of knowledge from generation to generation. Other connections were found with Indicator 3 focusing on preventative actions, in which a desire for this focus is communicated, however there is little uptake and more immediate priorities that take precedent.

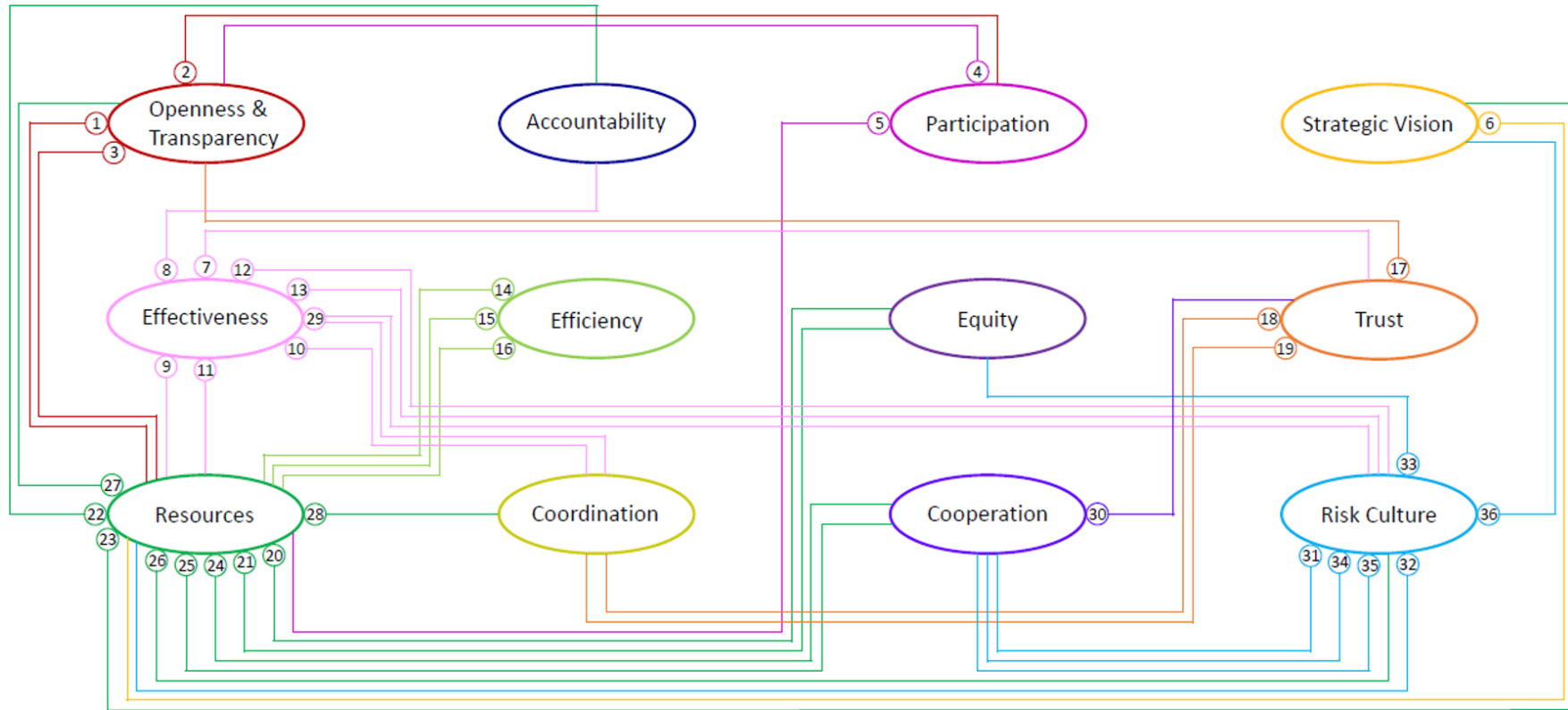


Figure 10.1: Connection mapping for Nechoiu catchment from interview transcript evidence base. Colors and number bubbles are used to indicate which indicator in one category is connected to another in another category. For example, for #1, this originates in an indicator for Openness & Transparency and is then connected to the evidence base of a different indicator in the Resources category. Explanations for each connection are provided in the follow texts, with the numbers as a reference point between the explained connection and the place in which one can view this on the diagram.

Openness & Transparency

- (1) Openness & Transparency (Indicator 1) connection to Resources (Indicator 1): general observation that more centralized institutions at higher levels do not have a problem with access to information
- (2) Openness & Transparency (Indicator 2) connection to Participation (Indicator 2): lack of information can affect ability to participate
- (3) Openness & Transparency (Indicator 1) connection to Resources (General): lack of available (accurate) risk information inhibits ability to work with (in) risk

Participation

- (4) Participation (Indicator 4) connection to Openness & Transparency (Indicator 4): local knowledge use on individual decision making basis (slightly missing component from current system)
- (5) Participation (Indicator 4) connection to Resources (General but can connect well to Indicator 1): use and reliance on local knowledge strong when other resources do not exist

Strategic Vision

- (6) Strategic Vision (Indicator 3) connection to Resources (General but can connect well to Indicator 1): lack of resources impacts (limits) how long term local authorities think they can plan for

Effectiveness

- (7) Effectiveness (Indicator 5) connection to Trust (Indicator 4): related to rule of law and specifically with regard to trust in people to “do the right thing”. This is connected to whether local authorities are not only interested in personal profit as a result of their actions
- (8) Effectiveness (Indicator 5) connection to Accountability (Indicator 1): even if clear and coherent, regulations not applied in practice and respected
- (9) Effectiveness (Indicator 5) connection to Resources (Indicators 2, 4, 5, and in General): lack of funds affects the ability to fulfill requirements with many examples including:
 - affects follow through for owner’s adherence to legal requirements for building permissions (Indicator 2)
 - because funds are minimal and budget is small the local level cannot fund preventative efforts (although legally their budget should provide for all phases) but must rather address more immediate day to day needs (Indicator 5)
 - lack of funds limits the information they can have and generate although, for example, the president of the county committee for emergency situations is required to have this information, they are also not able to go beyond legal requirements like addressing climatic changes and associated risks (it is not possible to do this within their given means) (Indicator 4)
 - laws requiring updates and even existence of plans are not adhered to due to lack of funds at the local level (General)

- Resources (Indicator 1) connection to Effectiveness (Indicator 5): not having what is legally required strongly connected to lack of funds (e.g. information, personnel, among others)
- (10) Effectiveness (Indicator 5) connection to Coordination (Indicator 3): given limited resources, authorities are proud they are able to function. (e.g. limited devices, although able to function well in past events, esp. with communication)
- (11) Effectiveness (Indicator 5) connection to Resources (Indicator 1): given limited resources, authorities are proud they are able to function.
- (12) Effectiveness (Indicator 5) connection to Risk Culture (General): given limited resources, authorities are proud they are able to function.
- (13) Effectiveness (Indicator 5) connection to Risk Culture (Indicator 2): laws not respected in 1989 after the Revolution with much illegal building

Efficiency

- (14) Efficiency (Indicator 1) connection to Resources (Indicator 1): most appropriate level of decision making greatly influenced (limited) by resources
- (15) Efficiency (Indicator 5) connection to Resources (General): lack of resources affecting amount of time needed for completing tasks (e.g. not having appropriate recording devices for monitoring, or 4WD vehicles to reach areas)
- (16) Efficiency (General) connection to Resources (General): all potential Efficiency factors seem to be inhibited by a deficit in resources

Trust

- (17) Trust (General) connection to Openness & Transparency (Indicator 1): missing issue of trust between different community members (e.g. in terms of whether people are truthful about the risks to the plot of land they are trying to sell)
- (18) Trust (Indicator 1) connection to Coordination (Indicator 2): good example with village representation system to building trust
- (19) Trust (Indicator 4) connection to Coordination (Indicator 1): issue with lack of trust from county authorities in self-initiative of local level

Resources

- (20) Resources (Indicators 1 and 5) connection to Equity (Indicator 3): lack of financial resources affects ability to relocate vulnerable groups (also on the scale of the individual persons themselves)
- (21) Resources (Indicator 1) connection to Equity (Indicator 2): resources (or lack thereof) affecting ability to reach isolated communities (e.g. specific resources needed to overcome difficult geographies)
- (22) Resources (Indicator 1) connection to Accountability (Indicator 4): lack of personnel and finances inhibits monitoring and map updating

- (23) Resources (Indicator 1) connection to Strategic Vision (Indicators 1, 3, 4, and in General): inability to have strategic vision and to think beyond the short term needs due to lack of resources
- (24) Resources (Indicator 1) connection to Cooperation (Indicator 1): in general cooperation (expressed as good communication) is good between local and county levels; however, there are sometimes issues that arise due to lack of funds (e.g. local level wants to request funds from county level, but they know they will be denied)
- (25) Resources (Indicator 1) connection to Cooperation (Indicator 4): clear and concise statement that meetings with county authorities and others tend to have constructive dialogue in which ideas for change are discussed together. The issue is how to implement this change. The perception is that "[t]his is a matter of organizing poverty", and with such limited resources each institution tries to prioritize their own resources for themselves (Transcript R-25 Deputy Director (ISU Buzău))
- (26) Resources (Indicator 1) connection to Risk Culture (all Indicators) (also through Cooperation Indicator 4): "organizing poverty" connected to feeling of "lost and poor" and strongly influencing priorities based on more economically-driven social problems:
- in some places (in general) there is a feeling of being "poor and lost", in which lack of education combines with poverty, which results in some cases to a 1) general lack of civic responsibility, and 2) in the case of recovery from damages after an event results in adverse behavior to reap economic benefit from reconstruction (e.g. some cases in which people not as affected as neighbors self-inflict greater damage to their property to be more greatly compensated) (Risk Culture Indicator 1)
 - unemployment and lack of money generally inhibit interest in awareness raising and risk education (Risk Culture Indicator 2)
 - prevention not prioritized because funds must be used toward more immediate needs, (e.g. unemployment and other economically induced social problems) (Risk Culture Indicator 3)
 - considering needs and priorities of local population, limited resources must be used to address immediate and practical problems, (e.g. aging population and unemployment) (Risk Culture Indicator 4)
 - activities (e.g. training, education) to protect livelihoods is not high on priority list compared to more immediate problems like providing food and shelter for the family, and having a job (Risk Culture Indicator 5)
- (27) Resources (Indicators 1 and 4) connection to Openness & Transparency (Indicator 3): lack of resources (and affordability of resources) affecting availability of printed information materials
- (28) Resources (General) connection to Coordination (Indicator 2): lack of funds negatively (at both local and county levels) influences ability to follow through with legal mandates and tasks (similar and connected also to Effectiveness Indicator 5)

Mixed: Effectiveness, Coordination, Risk Culture

- (29) Effectiveness (Indicator 5) connected to Coordination (General) and Risk Culture through Resources (General): lack of resources preventing ability to adhere to required actions, tasks, etc.
- Similar to the first bullet of number nine, adherence to required change to building or land structure (to reduce risk) requested by local administration depends on resources of the owner of that land (Coordination General)

- Legal provision for coordination between higher and local levels is well stated and good guidelines are provided, however issue in following guidelines due to lack of funds and education (Coordination Indicator 4) (Examples of requirements not fulfilled due to lack of resources: lack of compulsory landslide risk maps for county among other maps (Resources General))
- People know local authorities do not have enough resources and are overwhelmed, and therefore, complain instead to higher levels (Risk Culture General – connected to Coordination, Resources, and Effectiveness)

Cooperation

- (30) Cooperation (Indicator 1) connected to Trust (Indicator 1): trust connection to cooperation through good local communication structures

Risk Culture

- (31) Risk Culture (Indicator 1) connected to Cooperation (General): connection demonstrated between (potential lack of) civic responsibility and self-initiated actions from the population
- (32) Risk Culture (Indicator 2) connected to Resources (General): connection with knowledge passed down from ancestors as part of informational resource for awareness
- (33) Risk Culture (Indicator 2) connected to Equity (General): implication that awareness has changed and that people are not as aware as they were before (e.g. previously there were fewer buildings constructed in hazard prone areas, people knew where to build and where not to, but this does not seem to be the case anymore)
- (34) Risk Culture (Indicator 2) connected to Cooperation (Indicator 3): issue of change of people in charge but no accumulation of know-how. This points to a missing variable of knowledge (and awareness) of authorities, although this could be included in the preparedness focused indicator for Effectiveness (Indicator 3)
- (35) Risk Culture (Indicator 3) connected to Cooperation (Indicator 5): attempt to focus on prevention found within example of ISU Buzău efforts (e.g. work engaged each year with communes, although low response rate)
- (36) Risk Culture (Indicator 3) connected to Strategic Vision (Indicators 1 and 3): desire for prevention focus in strategic development but not fulfilled (Strategic Vision Indicator 1), and short term focus perpetuated because of other, more immediate priorities (Strategic Vision Indicator 3 (and 1))

10.4 Conclusions

This chapter provided the detailed results of the Nehoiu catchment (Romanian case study). As one of the main case studies along with the other main case study, the Barcelonnette catchment in France, the results presented here provide an in-depth look into how the category and indicator system can be used to analyze qualitative data from the semi-structured interviews, and furthermore provides detail as to how practices on the ground can be and are connected to these “good” risk governance categories. The presentation of

the category summaries enables the reader to look at individual categories and in-practice evidence supporting the interpretation of these categories, while the connection mapping visualizes the potential interdependencies and general connections in a more systematic view. Visualization of supporting evidence also assists in understanding the way one can perceive “good” risk governance as a concept supported by these categories (or principles), and contributes to the reflection on the analysis tool itself provided in Chapter 13.

Some of the main points that can be derived from the above detailed presentation of results include the high connectivity and severe issues with the category of resources for this particular case (inhibiting especially discussion of Strategic Vision and Efficiency). Another is the lack of self-initiated action at local level, which is strongly negatively perceived by county level authorities. Other issues relate to informational deficits, and although there are some efforts for improving these deficits such as the initiation of inventories for hazard identification and mapping, there is still much room for improvement. Positive aspects were also highlighted including a strong foundation and use of local knowledge into both local and county level planning and decision-making. Trust also appears to be a topic in which improvement has taken place over the last several years, which is also attributed to good communication and generally positively perceived cooperation (with some exceptions). With Risk Culture, what can be said for this case is that there is a desire to prevent risks, but that this (and efforts towards this) are inhibited by the aforementioned issues mentioned within the Resources category. These and other insights are provided and will be used in comparison with the other main case study (the topic of the next chapter), along with inputs from the satellite cases for the comparative analysis presented in Chapter 12.

Chapter 11

Main case results: Barcelonnette catchment (France)

11.1 Result summary

Similar to the Romanian case study, the results for the Barcelonnette catchment are summarized in a table with each category, its broad analysis statement, and the supporting evidence base in the form of the transcript IDs.

A few key points can be mentioned that are highlighted within this summary. One of which is “the problem of proximity”, which refers to the close spatial proximity and connectedness of local decision-makers, especially mayors, to the population and the potential negative consequences of this connection such as inappropriate construction permitting. The presented results also provide ways in which (in this case) efforts are made to combat these consequences. Another point is that there is a wide variety of available information and many examples of efforts to provide information to the population. However, with respect to the level of awareness of public, the perception of this varies depending on the key informant. There is a general trend that local authorities think no additional information is needed, while private firms, scientific institutions, and also higher level administrative entities think there is insufficient information, and that more education needed. Among community leaders, there is a tendency to think that they would like to have more information if they were made aware of a lack or a problem such as if they are mistaken in thinking an event could occur with an hour lead time but the reality is closer to 30 minutes. In this case, they would want to know this information and what they could do individually.

Regarding the provision of information, there is also the need to balance between provision of information and avoidance of frightening inhabitants and tourists. Special issues were also found in this context for informational needs of new inhabitants and tourists,

(although different approaches are required to reduce potential vulnerability as a result of lack of knowledge between these two groups). Of interest is also the apparent spatial function of vulnerability (where people are located makes them vulnerable), and the generally strong feeling of adherence to rule of law. The latter point is connected to perceived strictness of the current regulatory system and the issue of “the big umbrella” and the “principle of precaution”, which is seen in connection to a focus on prevention (please see Risk Culture evidence for further elaboration). One of the most substantial issues is the need and current effort toward greater intercommunal organization. This is seen as a major undertaking and stride forward to remedy the lack of resources at the local levels (communes), especially to realize structural mitigation measures and to enhance solidarity amongst communes, which currently can vary depending on type of hazard and whether multiple communes are affected. These and a multitude of other issues, patterns, and key points are identified and elaborated in Table 11.1, and in the next two sections: 11.2 *Presentation of “good” risk governance results by category* and 11.3 *Connection mapping and explanation*.

Table 11.1: Summary of results by category for Barcelonnette catchment (FR) case study

Category	Broad Analysis Statement	Evidence Base
<i>Openness & Transparency</i>	Good examples of availability, multiple sources of information, and importance on efforts to communicate information in simple and understandable way. Issues, however, include need to determine whether public (and according to the public) there is enough information (also for different social groups). Points to different informational needs of tourists and new inhabitants in contrast to long-standing residents. Also issue whether more public meetings needed to improve the knowledge of the population.	Transcript F-15&15a Superior Technician (RTM), F-16 Curator of Barcelonnette Museum, F-1 Geologist (BGRM), F-10 Deputy Departmental Director (DDT 05), F-21 Consultant (Environmental Studies and Guidance), F-22 Head of Group & Head of Center Departmental Fire and Rescue Service (SDIS 04), F-3 Engineer for Syndicate (Ubaye flood protection), F-2 Director (RTM), F-5 Barcelonnette Municipality Deputy for Culture, F-7 Private Planning Firm, F-14 President of the Sabença Association, F-18 Leader of Environmental Assessment Plans and Programs Division, (DREAL), F-20 Mayor of Faucon de Barcelonnette, F-23 Head of Urbanism Service and Head of Service for Environmental Risks (DDT 04), F-9 Private Planning Firm, F-8 Barcelonnette Municipality First Deputy, F-24 Head of Operations, Service for Major Natural Risks, Direction for Development and Housing, Provence-Alpes-Côte d'Azur Region, F-4 Barcelonnette Tourism Office, Transcript F-14 President of the Sabença Association , F-10 Deputy Departmental Director (DDT 05), F-11 Director (SDIS Barcelonnette), F-12 Mayor of Jausiers, F-15&15a Superior Technician (RTM), F-1 Geologist (BGRM), F-20 Mayor of Faucon de Barcelonnette, F-5 Barcelonnette Municipality Deputy for Culture, Transcript F-15&15a Superior Technician (RTM)

Table 11.1: (continued)

Category	Broad Analysis Statement	Evidence Base
<i>Accountability</i>	Regulations generally seen as clear, but substantial in number and complexity. Differentiation of responsibilities well-defined and works well in-practice (few exceptions). Many mechanisms for monitoring and reporting in order to keep authorities accountable for their actions. Specific attention paid to issues and importance of personal liability. Many examples of monitoring and maintenance for implemented measures. However, issues with the PPRN in terms of complexity, time required, and funding. Most negative issue is lack of maintenance for structural measures (local level) and inability to find a solution due to lack of funds.	Transcript F-17 Former President of the Sabença Association & former First Deputy of Barcelonnette Municipality, F-1 Geologist (BGRM), F-23 Head of Urbanism Service and Head of Service for Environmental Risks (DDT 04), F-10 Deputy Departmental Director (DDT 05), F-11 Director (SDIS Barcelonnette), F-12 Mayor of Jausiers, F-13 Deputy for Roads (General Council of Alpes-de-Haute-Provence), F-19 Former President of Civil Protection for Alpes-de-Haute-Provence, F-20 Mayor of Faucon de Barcelonnette, F-22 Head of Group & Head of Center Departmental Fire and Rescue Service (SDIS 04), F-3 Engineer for Syndicate (Ubaye flood protection), F-15&15a Superior Technician (RTM), F-9 Private Planning Firm, F-26 Private Planning Firm, F-18 Leader of Environmental Assessment Plans and Programs Division, (DREAL), F-21 Consultant (Environmental Studies and Guidance), F-24 Head of Operations, Service for Major Natural Risks, Direction for Development and Housing, Provence-Alpes-Côte d'Azur Region, F-7 Private Planning Firm, F-8 Barcelonnette Municipality First Deputy, F-6 Head of Local Development (Mercantour National Park), Transcript F-1 Geologist (BGRM), F-23 Head of Urbanism Service and Head of Service for Environmental Risks (DDT 04), F-5 Barcelonnette Municipality Deputy for Culture, F-9 Private Planning Firm, F-17 Former President of the Sabença Association & former First Deputy of Barcelonnette Municipality, F-3 Engineer for Syndicate (Ubaye flood protection), Transcript F-26 Private Planning Firm, F-9 Private Planning Firm, F-19 Former President of Civil Protection for Alpes-de-Haute-Provence, F-24 Head of Operations, Service for Major Natural Risks, Direction for Development and Housing, Provence-Alpes-Côte d'Azur Region, F-12 Mayor of Jausiers, F-8 Barcelonnette Municipality First Deputy, F-10 Deputy Departmental Director (DDT 05)

Table 11.1: (continued)

Category	Broad Analysis Statement	Evidence Base
<i>Participation</i>	Good examples of involvement in consultation activities, especially for public inquiry. However, the general public not directly involved in processes for decision-making. No evidence of “active involvement”. Indirect involvement present with volunteering as well as contributing information and other resources. Examples of use of local knowledge present. Some trainings for the population. Insufficient evidence for feedback systems.	Transcript F-15&15a Superior Technician (RTM), F-1 Geologist (BGRM), F-23 Head of Urbanism Service and Head of Service for Environmental Risks (DDT 04), F-25 Former Head of Natural Risks Projects, Grontmij Environment & Infrastructures (private planning firm), F-7 Private Planning Firm, F-12 Mayor of Jausiers, F-19 Former President of Civil Protection for Alpes-de-Haute-Provence, F-24 Head of Operations, Service for Major Natural Risks, Direction for Development and Housing, Provence-Alpes-Côte d’Azur Region, F-8 Barcelonnette Municipality First Deputy, F-10 Deputy Departmental Director (DDT 05), F-3 Engineer for Syndicate (Ubaye flood protection), (Additionally: general observation from researcher from preliminary and primary fieldwork), Transcript F-13 Deputy for Roads (General Council of Alpes-de-Haute-Provence) , F-15&15a Superior Technician (RTM), F-25 Former Head of Natural Risks Projects, Grontmij Environment & Infrastructures (private planning firm), F-11 Director (SDIS Barcelonnette), F-12 Mayor of Jausiers, F-14 President of the Sabença Association, F-16 Curator of Barcelonnette, F-19 Former President of Civil Protection for Alpes-de-Haute-Provence, F-20 Mayor of Faucon de Barcelonnette, F-3 Engineer for Syndicate (Ubaye flood protection), F-5 Barcelonnette Municipality Deputy for Culture, F-8 Barcelonnette Municipality First Deputy, F-22 Head of Group & Head of Center Departmental Fire and Rescue Service (SDIS 04), F-2 Director (RTM), F-26 Private Planning Firm
<i>Strategic Vision</i>	Very limited evidence although some key points including: increased consciousness of risks by public authorities, supported by scientific input at the local level; but also critique of officials’ (lack of) interest in protecting the environment. Some progress toward more long term and preventative focus. Some common priorities found in educational efforts (with focus on children), continuation of local knowledge, (also for greater preventative focus), more organization at intercommunal level, and in maintenance of structural measures. Several structures for future goal orientation found (e.g. PLU, POS, PADD, Stratégie Barcelonnette 2020-2030).	Transcript F-4 Barcelonnette Tourism Office, F-12 Mayor of Jausiers, F-2 Director (RTM), F-3 Engineer for Syndicate (Ubaye flood protection), F-5 Barcelonnette Municipality Deputy for Culture, F-10 Deputy Departmental Director (DDT 05), F-13 Deputy for Roads (General Council of Alpes-de-Haute-Provence), F-14 President of the Sabença Association, F-1 Geologist (BGRM), F-15&15a Superior Technician (RTM), F-22 Head of Group & Head of Center Departmental Fire and Rescue Service (SDIS 04), F-24 Head of Operations, Service for Major Natural Risks, Direction for Development and Housing, Provence-Alpes-Côte d’Azur Region, F-26 Private Planning Firm, F-8 Barcelonnette Municipality First Deputy, F-9 Private Planning Firm, F-21 Consultant (Environmental Studies and Guidance), Transcript F-19 Former President of Civil Protection for Alpes-de-Haute-Provence , Transcript F-21 Consultant (Environmental Studies and Guidance)

Table 11.1: (continued)

Category	Broad Analysis Statement	Evidence Base
<i>Effectiveness</i>	Limited (though some) evidence to indicate general perception from a community leader that authorities appear well-prepared and capable (especially during an event). EWS generally working well for flood and landslide, although some limitations (e.g. limited lead time) and potential improvement through intercommunal efforts. Issues expressed ineffectiveness of road closure systems. Much evidence for respect to rule of law (both positive and negative examples). Yet, overall perception authorities generally adhere to legal requirements. For flexibility (no evidence with redundancy), laws stated to be rather restrictive, though both positive and negative examples of consequences given (e.g. need for laws made at the national level to be more flexible to type of territory managed).	Transcript F-11 Director (SDIS Barcelonnette), F-14 President of the Sabença Association, F-17 Former President of the Sabença Association & former First Deputy of Barcelonnette Municipality, F-6 Head of Local Development (Mercantour National Park), F-3 Engineer for Syndicate (Ubaye flood protection), F-10 Deputy Departmental Director (DDT 05), F-13 Deputy for Roads (General Council of Alpes-de-Haute-Provence), F-15&15a Superior Technician (RTM), F-23 Head of Urbanism Service and Head of Service for Environmental Risks (DDT 04), F-7 Private Planning Firm, F-16 Curator of Barcelonnette Museum, F-18 Leader of Environmental Assessment Plans and Programs Division, (DREAL), F-20 Mayor of Faucon de Barcelonnette, F-9 Private Planning Firm, Transcript F-15&15a Superior Technician (RTM), F-19 Former President of Civil Protection for Alpes-de-Haute-Provence, F-5 Barcelonnette Municipality Deputy for Culture, F-12 Mayor of Jausiers, F-10 Deputy Departmental Director (DDT 05), F-9 Private Planning Firm, F-26 Private Planning Firm, F-18 Leader of Environmental Assessment Plans and Programs Division, (DREAL), F-24 Head of Operations, Service for Major Natural Risks, Direction for Development and Housing, Provence-Alpes-Côte d'Azur Region, Transcript F-4 Barcelonnette Tourism Office, F-6 Head of Local Development (Mercantour National Park), F-3 Engineer for Syndicate (Ubaye flood protection), F-12 Mayor of Jausiers, F-13 Deputy for Roads (General Council of Alpes-de-Haute-Provence), F-15&15a Superior Technician (RTM), F-20 Mayor of Faucon de Barcelonnette, F-23 Head of Urbanism Service and Head of Service for Environmental Risks (DDT 04), F-2 Director (RTM), F-5 Barcelonnette Municipality Deputy for Culture, F-7 Private Planning Firm, F-18 Leader of Environmental Assessment Plans and Programs Division, (DREAL), F-17 Former President of the Sabença Association & former First Deputy of Barcelonnette Municipality, F-24 Head of Operations, Service for Major Natural Risks, Direction for Development and Housing, Provence-Alpes-Côte d'Azur Region

Table 11.1: (continued)

Category	Broad Analysis Statement	Evidence Base
<i>Efficiency</i>	Much input on efforts to increase intercommunal organization and suggestions of what should be at régional level. Insufficient evidence for exchange of best practices. General perspective that pooling resources needed amongst communes to assist in realizing necessary projects. Timing and reaction perceived as good, with close proximity to Sub-Prefect decision-makers. Avoiding duplication of work and extra costs examples in decision-making hierarchy (assists overall efficiency). Suggestion that PLU and PPRN be created simultaneously. PPRN is a good tool, but expensive and not necessary for small areas.	Transcript F-12 Mayor of Jausiers, F-15&15a Superior Technician (RTM), F-5 Barcelonnette Municipality Deputy for Culture, F-19 Former President of Civil Protection for Alpes-de-Haute-Provence, F-22 Head of Group & Head of Center Departmental Fire and Rescue Service (SDIS 04), F-4 Barcelonnette Tourism Office, F-8 Barcelonnette Municipality First Deputy, Transcript F-15&15a Superior Technician (RTM), F-18 Leader of Environmental Assessment Plans and Programs Division, (DREAL), F-23 Head of Urbanism Service and Head of Service for Environmental Risks (DDT 04), F-24 Head of Operations, Service for Major Natural Risks, Direction for Development and Housing, Provence-Alpes-Côte d'Azur Region, F-25 Former Head of Natural Risks Projects, Grontmij Environment & Infrastructures (private planning firm), F-3 Engineer for Syndicate (Ubaye flood protection), F-6 Head of Local Development (Mercantour National Park), F-20 Mayor of Faucon de Barcelonnette, F-26 Private Planning Firm, (Additionally: general observation from researcher from preliminary and primary fieldwork), Transcript F-10 Deputy Departmental Director (DDT 05)
<i>Equity</i>	Insufficient evidence for inter-generational equity. Well understood issue of vulnerability as a spatial function (location based), though age recurrently mentioned as a factor. General patterns of feeling that the rural, more isolated, mountainous areas not encouraged nor as supported by state compared to more populated areas. Good examples for strategies addressing vulnerable groups. Improvement made in enhancing knowledge of scattered elderly population. Issue of need for new inhabitants to access local knowledge networks. Good examples of solidarity (e.g. from past events) but depends on the type of event and if multiple communes affected.	Transcript F-10 Deputy Departmental Director (DDT 05), F-14 President of the Sabença Association, F-5 Barcelonnette Municipality Deputy for Culture, Association, F-19 Former President of Civil Protection for Alpes-de-Haute-Provence Transcript F-19 Former President of Civil Protection for Alpes-de-Haute-Provence, F-10 Deputy Departmental Director (DDT 05), F-12 Mayor of Jausiers, F-16 Curator of Barcelonnette Museum, F-17 Former President of the Sabença Association & former First Deputy of Barcelonnette Municipality, F-22 Head of Group & Head of Center Departmental Fire and Rescue Service (SDIS 04), F-15&15a Superior Technician (RTM), F-8 Barcelonnette Municipality First Deputy Transcript F-11 Director (SDIS Barcelonnette), F-13 Deputy for Roads (General Council of Alpes-de-Haute-Provence), F-14 President of the Sabença Association, F-3 Engineer for Syndicate (Ubaye flood protection), F-5 Barcelonnette Municipality Deputy for Culture, F-6 Head of Local Development (Mercantour National Park), F-20 Mayor of Faucon de Barcelonnette, Transcript F-12 Mayor of Jausiers, F-10 Deputy Departmental Director (DDT 05), F-3 Engineer for Syndicate (Ubaye flood protection), F-24 Head of Operations, Service for Major Natural Risks, Direction for Development and Housing, Provence-Alpes-Côte d'Azur Region, F-8 Barcelonnette Municipality First Deputy, F-9 Private Planning Firm

Table 11.1: (continued)

Category	Broad Analysis Statement	Evidence Base
<i>Trust</i>	Overall a good level of confidence (many times stated trust) between the public and local authorities (strong example with RTM). Good level of trust between the population and higher level authorities, but stronger connection between the population and the local level compared to higher levels (closer proximity enhances confidence at local level). Confidence between authorities on different vertical levels (although limited evidence) and within the same horizontal level. Some examples mixed for trust between authorities and consulting firms as well as amongst firms.	Transcript F-11 Director (SDIS Barcelonnette), F-14 President of the Sabença Association, F-15&15a Superior Technician (RTM), F-16 Curator of Barcelonnette Museum, F-17 Former President of the Sabença Association & former First Deputy of Barcelonnette Municipality, F-19 Former President of Civil Protection for Alpes-de-Haute-Provence, F-3 Engineer for Syndicate (Ubaye flood protection), F-6 Head of Local Development (Mercantour National Park), F-5 Barcelonnette Municipality Deputy for Culture, F-8 Barcelonnette Municipality First Deputy, F-20 Mayor of Faucon de Barcelonnette, F-22 Head of Group & Head of Center Departmental Fire and Rescue Service (SDIS 04), F-13 Deputy for Roads (General Council of Alpes-de-Haute-Provence), F-26 Private Planning Firm, F-2 Director (RTM), F-9 Private Planning Firm, Transcript F-15&15a Superior Technician (RTM), F-22 Head of Group & Head of Center Departmental Fire and Rescue Service (SDIS 04), F-18 Leader of Environmental Assessment Plans and Programs Division, (DREAL), F-1 Geologist (BGRM), F-9 Private Planning Firm
<i>Resources</i>	No dramatic (completely debilitating) deficit in available resources, but needs expressed (e.g. resources for RTM and funding for local projects, also more personnel and finances for a range of actors). Lack of PPRN problematic. Some good examples of interoperability of resources in software used by DDT and other officials. Also for positions created to interpret technical information. Some negative examples (e.g. critiques that PLU sometimes not specific enough, also a need for better management of sharing equipment across communes during an event). Good examples of inventories. Some issues with affordability of information and studies for small communes. Back-up assets examples: insurance at individual level, reimbursement mechanisms for communes through state, and contributions from central government if state of disaster declared.	Transcript F-10 Deputy Departmental Director (DDT 05), F-15&15a Superior Technician (RTM), F-17 Former President of the Sabença Association & former First Deputy of Barcelonnette Municipality, F-21 Consultant (Environmental Studies and Guidance), F-22 Head of Group & Head of Center Departmental Fire and Rescue Service (SDIS 04), F-3 Engineer for Syndicate (Ubaye flood protection), F-8 Barcelonnette Municipality First Deputy, F-7 Private Planning Firm, F-12 Mayor of Jausiers, F-1 Geologist (BGRM), F-2 Director (RTM), Transcript F-11 Director (SDIS Barcelonnette), F-13 Deputy for Roads (General Council of Alpes-de-Haute-Provence), F-18 Leader of Environmental Assessment Plans and Programs Division, (DREAL), F-22 Head of Group & Head of Center Departmental Fire and Rescue Service (SDIS 04), F-3 Engineer for Syndicate (Ubaye flood protection), F-24 Head of Operations, Service for Major Natural Risks, Direction for Development and Housing, Provence-Alpes-Côte d'Azur Region, F-20 Mayor of Faucon de Barcelonnette, F-12 Mayor of Jausiers, F-8 Barcelonnette Municipality First Deputy, Transcript F-10 Deputy Departmental Director (DDT 05), F-12 Mayor of Jausiers, F-15&15a Superior Technician (RTM), F-18 Leader of Environmental Assessment Plans and Programs Division, (DREAL), F-19 Former President of Civil Protection for Alpes-de-Haute-Provence, F-1 Geologist (BGRM), F-26 Private Planning Firm, F-2 Director (RTM), F-3 Engineer for Syndicate (Ubaye flood protection), F-9 Private Planning Firm, F-7 Private Planning Firm, F-8 Barcelonnette Municipality First Deputy, F-20 Mayor of Faucon de Barcelonnette

Table 11.1: (continued)

Category	Broad Analysis Statement	Evidence Base
<i>Coordination</i>	Good examples found in evidence for harmonization efforts and common procedures, positive perceptions also provided in descriptions of coordinated tasks amongst same horizontal level stakeholders and different vertical level stakeholders. Issues including “the problem of proximity” (although some efforts are made to find solution) and in sharing equipment amongst communes. Issue also in inadequate resources to complete mandatory tasks at commune level. Many communicative links found within legally required tasks and interactions. Good example of external planning firms as neutral agent in presenting project proposals to the public.	Transcript F-10 Deputy Departmental Director (DDT 05), F-20 Mayor of Faucon de Barcelonnette, F-22 Head of Group & Head of Center Departmental Fire and Rescue Service (SDIS 04), F-7 Private Planning Firm, F-9 Private Planning Firm, F-12 Mayor of Jausiers, F-13 Deputy for Roads (General Council of Alpes-de-Haute-Provence), F-15&15a Superior Technician (RTM), F-11 Director (SDIS Barcelonnette), F-6 Head of Local Development (Mercantour National Park), F-8 Barcelonnette Municipality First Deputy, F-26 Private Planning Firm, Transcript F-20 Mayor of Faucon de Barcelonnette, F-23 Head of Urbanism Service and Head of Service for Environmental Risks (DDT 04), F-24 Head of Operations, Service for Major Natural Risks, Direction for Development and Housing, Provence-Alpes-Côte d’Azur Region, F-11 Director (SDIS Barcelonnette), F-22 Head of Group & Head of Center Departmental Fire and Rescue Service (SDIS 04), F-18 Leader of Environmental Assessment Plans and Programs Division, (DREAL), F-3 Engineer for Syndicate (Ubaye flood protection), F-7 Private Planning Firm, F-10 Deputy Departmental Director (DDT 05), F-13 Deputy for Roads (General Council of Alpes-de-Haute-Provence), F-1 Geologist (BGRM), F-21 Consultant (Environmental Studies and Guidance), F-25 Former Head of Natural Risks Projects, Grontmij Environment & Infrastructures (private planning firm), F-2 Director (RTM), F-8 Barcelonnette Municipality First Deputy, Transcript F-3 Engineer for Syndicate (Ubaye flood protection), F-8 Barcelonnette Municipality First Deputy, F-18 Leader of Environmental Assessment Plans and Programs Division, (DREAL), F-13 Deputy for Roads (General Council of Alpes-de-Haute-Provence)

Table 11.1: (continued)

Category	Broad Analysis Statement	Evidence Base
<i>Cooperation</i>	<p>Lack of cooperation and problems at local political level especially in terms of funding protection works (e.g. dikes & reinforcing embankments along the valley). Increasing intercommunal planning and organization help remedy this. Positive examples including: regular meetings with wide range of actors at département level, and well perceived cooperation for crisis related tasks. Positively perceived attitude of authorities toward public interaction. Flexibility pursued by the municipal offices in favor of the needs of the public. Potential to increase informal interaction with the public through mission of the Syndicat, (could help alleviate currently perceived deficit). Very wide range of informal interactions amongst different actors and especially across sectors. Suggestions given for problems including: informational forums with all river stakeholders and a means for civil protection's advice to contribute to rescue plans. Further suggestion: more training for the public good idea, but must be cautious to not scare population, (esp. tourists). Good examples for informal structures of information exchanges: many informal meetings with variety of actors from all levels on topic of risk; crisis management center developed at Séolane Barcelonnette, structure established through Syndicat with local and higher level authorities.</p>	<p>Transcript F-11 Director (SDIS Barcelonnette), F-17 Former President of the Sabença Association & former First Deputy of Barcelonnette Municipality, F-19 Former President of Civil Protection for Alpes-de-Haute-Provence, F-20 Mayor of Faucon de Barcelonnette, F-8 Barcelonnette Municipality First Deputy, F-9 Private Planning Firm, F-5 Barcelonnette Municipality Deputy for Culture, F-2 Director (RTM), F-15&15a Superior Technician (RTM), F-10 Deputy Departmental Director (DDT 05), F-21 Consultant (Environmental Studies and Guidance), F-22 Head of Group & Head of Center Departmental Fire and Rescue Service (SDIS 04), F-23 Head of Urbanism Service and Head of Service for Environmental Risks (DDT 04), F-4 Barcelonnette Tourism Office, F-3 Engineer for Syndicate (Ubaye flood protection), F-1 Geologist (BGRM), Transcript F-1 Geologist (BGRM), F-11 Director (SDIS Barcelonnette), F-13 Deputy for Roads (General Council of Alpes-de-Haute-Provence), F-12 Mayor of Jausiers, F-3 Engineer for Syndicate (Ubaye flood protection), F-8 Barcelonnette Municipality First Deputy, F-15&15a Superior Technician (RTM), F-24 Head of Operations, Service for Major Natural Risks, Direction for Development and Housing, Provence-Alpes-Côte d'Azur Region, F-26 Private Planning Firm, F-19 Former President of Civil Protection for Alpes-de-Haute-Provence, Transcript F-19 Former President of Civil Protection for Alpes-de-Haute-Provence, F-3 Engineer for Syndicate (Ubaye flood protection)</p>

Table 11.1: (continued)

Category	Broad Analysis Statement	Evidence Base
<i>Risk Culture</i>	<p>This category had by far the most substantial evidence base. For self-initiated actions, insurance as a good example. Availability of information does not guarantee action on individual level (also depends on hazard type). Uncertainty with where to find individual and home protection information. Good examples found supporting awareness. Strong connection between awareness and location in which people live; however, very mixed views whether population is aware (varied by informant type). A key problem: lack of awareness for newcomers and for tourists, also evidence suggesting more public meetings and further education needed. Mixed perceptions on whether strategies focus on prevention. Views range widely amongst different informant types (e.g. from perception that substantial efforts are made for prevention, to need for improvement and for reactive nature of actions taken by authorities). Other issues: courage is needed to pursue preventative actions that are not readily visible, problems (as well as some benefits) to “the big umbrella” also known as the “principle of precaution”. Good examples for integrating local needs in consultations between consulting firms and public. Many interests that are and must be considered provided and reveal risks and hazards generally not in top priorities (rather in middle or bottom of list). Financial limitations of small rural communes assisted through risk management at intercommunal level. Issue of “the problem of proximity”, highlighting attention to local needs but with potentially negative consequences - an issue also assisted by greater intercommunal territorial management. Limited evidence about maintaining livelihoods though some efforts to create jobs and attract industry. Issue of conflicts between favoring urbanized versus rural areas. Another issue: people do not understand that the Syndicat will not protect crops (e.g. in the case of an event).</p>	<p>Transcript F-5 Barcelonnette Municipality Deputy for Culture, F10 Deputy Departmental Director (DDT 05), F-14 President of the Sabença Association, F-4 Barcelonnette Tourism Office, F-9 Private Planning Firm, Transcript F-16 Curator of Barcelonnette Museum, F-4 Barcelonnette Tourism Office, F-5 Barcelonnette Municipality Deputy for Culture, F-6 Head of Local Development (Mercantour National Park), F-17 Former President of the Sabença Association & former First Deputy of Barcelonnette Municipality, F-23 Head of Urbanism Service and Head of Service for Environmental Risks (DDT 04), F-26 Private Planning Firm, F-3 Engineer for Syndicate (Ubaye flood protection), F-13 Deputy for Roads (General Council of Alpes-de-Haute-Provence), F-2 Director (RTM), F-9 Private Planning Firm, F-10 Deputy Departmental Director (DDT 05), F-11 Director (SDIS Barcelonnette), F-15&15a Superior Technician (RTM), F-19 Former President of Civil Protection for Alpes-de-Haute-Provence, F-1 Geologist (BGRM), F-20 Mayor of Faucon de Barcelonnette, F-21 Consultant (Environmental Studies and Guidance), F-24 Head of Operations, Service for Major Natural Risks, Direction for Development and Housing, Provence-Alpes-Côte d'Azur Region, F-18 Leader of Environmental Assessment Plans and Programs Division, (DREAL), F-12 Mayor of Jausiers, F-22 Head of Group & Head of Center Departmental Fire and Rescue Service (SDIS 04), F-25 Former Head of Natural Risks Projects, Grontmij Environment & Infrastructures (private planning firm), F-7 Private Planning Firm, F-8 Barcelonnette Municipality First Deputy, Transcript F-24 Head of Operations, Service for Major Natural Risks, Direction for Development and Housing, Provence-Alpes-Côte d'Azur Region, F-4 Barcelonnette Tourism Office, F-8 Barcelonnette Municipality First Deputy, F-9 Private Planning Firm, F-14 President of the Sabença Association, F-10 Deputy Departmental Director (DDT 05), F-11 Director (SDIS Barcelonnette), F-15 F-15&15a Superior Technician (RTM), F-16 Curator of Barcelonnette Museum, F-23 Head of Urbanism Service and Head of Service for Environmental Risks (DDT 04), F-3 Engineer for Syndicate (Ubaye flood protection), F-6 Head of Local Development (Mercantour National Park), F-5 Barcelonnette Municipality Deputy for Culture, F-7 Private Planning Firm, F-17 Former President of the Sabença Association & former First Deputy of Barcelonnette Municipality, F-13 Deputy for Roads (General Council of Alpes-de-Haute-Provence), F-18 Leader of Environmental Assessment Plans and Programs Division, (DREAL), F-26 Private Planning Firm</p>

11.2 Presentation of “good” risk governance results by category

Openness & Transparency (FR)

For this category, defined as: *Information related to risk-management practices, and the practices themselves, should be available, accessible, and coherent for all those who assess, manage, and are/or are affected by risks both in peace and in crisis time*, many good examples existed with a substantial evidence base including good examples of availability, multiple sources of information, and importance on efforts to communicate information in a simple and understandable way. Open issues, however, include the need to determine whether the public (and according to the public) there is enough information and also for different social groups. This points to different informational needs between newcomers such as tourists and new inhabitants versus long-standing residents. There is also an issue of whether there should be more public meetings to improve the knowledge of the population, and specifically in light of whether these meetings happen as regularly as they are required to be held.

Table 11.2: Openness & Transparency category and indicator traffic light results

Indicator	Traffic Light Output (G/Y/R)	Evidence Base
(1) Risk and hazard information is openly available and accessible.	Green: several good examples exist including an online database from the RTM, an online platform from the BRGM, literature from historical society L'Association Sabença de la Valéia, and scientific information from Séolane Barcelonnette	Transcript F-15&15a Superior Technician (RTM), F-16 Curator of Barcelonnette Museum, F-1 Geologist (BGRM), F-10 Deputy Departmental Director (DDT 05), F-21 Consultant (Environmental Studies and Guidance), F-22 Head of Group & Head of Center Departmental Fire and Rescue Service (SDIS 04), F-3 Engineer for Syndicate (Ubaye flood protection), F-2 Director (RTM)
(2) This information is provided to the public in a clear, understandable language.	Green: wide range of authorities place importance on efforts to communicate information in simple and understandable way (although not an easy task), evidence from community leaders that information is indeed understandable	Transcript F-10 Deputy Departmental Director (DDT 05), F-15&15a Superior Technician (RTM), F-16 Curator of Barcelonnette Museum, F-21 Consultant (Environmental Studies and Guidance), F-5 Barcelonnette Municipality Deputy for Culture, F-7 Private Planning Firm

Table 11.2: (continued)

Indicator	Traffic Light Output (G/Y/R)	Evidence Base
<p>(3) Risk information (including risk maps) is widely disseminated especially to the following audiences: the public, communities at risk, and decision-makers.</p>	<p>Green: many examples of dissemination including scientific seminars, dissemination through meetings and consultation for plan and project updates, public notices from environmental authorities, informational leaflets from local authorities to the population, and wide dissemination of the DICRIM to the public</p> <p>Red: issue that there should be more public meetings to improve the knowledge of the population and that this does not happen as often as it should</p>	<p>Transcript F-10 Deputy Departmental Director (DDT 05), F-15&15a Superior Technician (RTM), F-16 Curator of Barcelonnette Museum, F-21 Consultant (Environmental Studies and Guidance), F-5 Barcelonnette Municipality Deputy for Culture, F-7 Private Planning Firm Transcript F-15&15a Superior Technician (RTM)</p>
<p>(4) The public has enough information and does not have a feeling of incomplete information, especially in case of an event in which information is updated and repeated.</p>	<p>Yellow: evidence is very mixed ranging from local municipal authorities tending to assume there is enough information; risk assessment based authorities assuming there is not adequate information; and a very mixed community leader perspective indicating important issues with new inhabitants and tourists not having information as compared to long standing residence</p>	<p>Transcript F-14 President of the Sabença Association, F-10 Deputy Departmental Director (DDT 05), F-11 Director (SDIS Barcelonnette), F-12 Mayor of Jausiers, F-15&15a Superior Technician (RTM), F-1 Geologist (BGRM), F-20 Mayor of Faucon de Barcelonnette, F-5 Barcelonnette Municipality Deputy for Culture</p>
<p>(5) Multiple sources of information exist (e.g. a variety of communication methods are pursued) (FROM FIRST 5 INTERVIEWS).</p>	<p>Green: substantial evidence and good examples of multiple sources of information in a variety of mediums</p>	<p>Transcript F-14 President of the Sabença Association, F-16 Curator of Barcelonnette Museum, F-23 Head of Urbanism Service and Head of Service for Environmental Risks (DDT 04), F-24 Head of Operations, Service for Major Natural Risks, Direction for Development and Housing, Provence-Alpes-Côte d’Azur Region, F-4 Barcelonnette Tourism Office</p>

Summary for Openness & Transparency

1. A number of examples were found in the existence of and efforts to make information

available and accessible including: online databases from the RTM (via website featuring information about events and measurements in the valley over the last 100 years) and the BRGM platform (featuring information related to risk that was previously fragmented and not public); scientific seminars and forums at Séolane Barcelonnette (which is regularly featured and communicated to the public also via the mayor); and local literature produced by the historical society L'Association Sabença de la Valéia (featuring historically information about past events).¹ Additionally, information about meteorological events is very commonly found and discussed on the radio and television. This information, but especially the BRGM platform, helps enable people to have access to risk and hazard related information even if other forms of information are not available (e.g. if there is no PPRN for their area). Information concerning potential risks is also available and accessible for public and private projects, including the creation of the PLU, during the public inquiry period and is communicated by the mayor's office and made available online.

Another good example is the document called the DICRIM (Document d'Information Communal sur les Risques Majeurs) which is made available to the public via the prefect and includes information about what needs to be done, what and where resources are available, and locations of meeting points (all in preparation for a crisis).

2. A wide range of authorities (including public and private planning offices, forestry, and municipal and departmental offices) place importance on current efforts to communicate information in a simple and understandable way to the local authorities and public. This was explicitly expressed for teaching and explaining (in simple terms) risk and the PPRN to the public as well as reasons for permitting or prohibiting building permissions (e.g. for any new construction). Evidence also exists from community leaders that the information received is indeed understandable. Although important, simplifying and communicating especially risk information that touches on some very technical fields in an understandable manner was also stressed as being at times difficult to achieve.

3. Examples of dissemination include: the research presented at Séolane Barcelonnette to the public and authorities, dissemination during updates of the plans and projects to the public (e.g. the PPRN) as well as public notices from environmental authorities, some (though rare) public meetings held by the BGRM for specific hazards, hard copy informational leaflets given to the public by municipal authorities in case of crisis, and distribution of the DICRIM to all inhabitants via post. One critique, however, is that there should be more public meetings to improve the knowledge of the population and that this does not

¹ The association also produces a paper every three months and contains information including any of the events or risks. There are also different books on a variety of topics, including the geology of the valley, torrents, glaciers, etc.

happen as often as it should, especially as people have short memories and there are other priorities with the exception of if there is an event.

4. There is some evidence suggesting that at the local level there is adequate enough information to manage risks. However, some informants (especially scientists and other actors working in risk assessment) do not believe that the public and local authorities have enough information related to risk. This is why, for example, the BGRM has made the aforementioned platform in order to have all of the existing public information in one place for the public. In contrast, local municipal authorities tend to think the population has (and is provided with) enough risk information. At the level of community leaders and other local authorities, responses are mixed and include the following considerations:

- though there have been improvements in information provision since the establishment of Séolane Barcelonnette, the local administration does not provide specific informational actions to the public, and it is not certain whether the population (in general) would like to have more information
- knowledge of the risks (and therefore need for information) depends on the type of population, especially as people who are born in the Alps or who have lived there a long time know the risks well, while those who are there as tourists or for retirement, and new inhabitants tend to not know the risks and are not provided any information on this
- attempting to inform tourists about risks is difficult often because they are here only temporarily and normally have no interest in the subject and is an exacerbated challenge during tourist season as there are around 8,000 people here year round (who have lived here for a long time, but during tourist season this number can reach 35,000.²

The issue of ensuring that there is a balance between having enough information and not scaring the population was brought up while discussing whether the public has enough information, especially for tourists (this is revisited in the Risk Culture category).

5. In general, there is substantial evidence to indicate the existence of multiple sources of information. This is a reason given for why in areas without a PPRN there is not an issue because one can find and be able to communicate information to the public from other sources. In addition to the sources mentioned in the Indicator 1 evidence (e.g. scientific information presented at Séolane Barcelonnette, literature from L’Association Sabença de la Valéia, online platforms, and radio), information is also made available through exhibitions

² A suggestion provided was that (perhaps) more information could be given in the tourism office or identify places to give advice.

at the museums in Barcelonnette and Jausiers.³ Other sources include SMS alerts during events, for example, for road closures and information via government websites including the website of the Region and from the Météo France (French meteorological service).

Accountability (FR)

With respect to Accountability, defined as: **Roles and responsibilities (and the distribution thereof) must be clear and a form of evaluation, reporting, monitoring, and or maintenance of actions, measures and systems should exist to ensure the fulfillment of these roles and responsibilities**, regulations were generally seen as clear although substantial in number and complexity. The differentiation of responsibilities was also well-defined and works well in-practice with a few exceptions. Substantial evidence suggests many mechanisms for monitoring and reporting to keep authorities accountable for their actions, with specific attention also to issues and importance of personal liability. Many examples exist for monitoring and maintenance of implemented measures; however, some issues with the PPRN in this respect exist especially for complexity, time required, and funding. The most negative issue is the lack of maintenance of structural mitigation measures at the local level and the inability to remedy this substantial risk due to lack of funds.

³ At the museum in Barcelonnette, in the past this has included information on the flood of 1957, featuring amateur videos of the flood, and areal pictures taken via helicopter.

Table 11.3: Accountability category and indicator traffic light results

Indicator	Traffic Light Output (G/Y/R)	Evidence Base
<p>(1) Risk management procedures, including their supporting policies and legal framework, are clear and coherent.</p>	<p>Green: in general, regulations concerning risk are clear, also for risk prevention</p> <p>Yellow: although laws and procedures are clear, issues presented that there are too many laws and that these can be quite complicated, number of laws perceived to create difficulties for individual communes, why (in part) efforts are taken to work at intercommunal level, only part of the law that has not been clear is that public data is not so public (why the BGRM is using an online platform to make information more public)</p> <p>Red: it is difficult to keep track of new legislation and difficult to make changes as consequence of complexity</p>	<p>Transcript F-17 Former President of the Sabença Association & former First Deputy of Barcelonnette Municipality, F-1 Geologist (BGRM), F-23 Head of Urbanism Service and Head of Service for Environmental Risks (DDT 04)</p> <p>Transcript F-1 Geologist (BGRM), F-9 Private Planning Firm, F-17 Former President of the Sabença Association & former First Deputy of Barcelonnette Municipality, F-3 Engineer for Syndicate (Ubaye flood protection)</p> <p>Transcript F-26 Private Planning Firm, F-9 Private Planning Firm</p>
<p>(2) The differentiation of responsibilities between and within different levels is clear and avoids problematic overlaps.</p>	<p>Green: responsibilities are quite well-defined and (in general) there are no problematic overlaps between rescue authorities as well as between administrative authorities (across different vertical levels as well as within same, horizontal levels), additionally a number of documents exist defining and guiding roles and responsibilities of actors involved in risk including: DDRM (Le Dossier Départemental sur les Risques Majeurs) and SDACR (Schéma Départemental d'Analyse et de Couverture des Risques)</p> <p>Red: few exceptions to this general status include some tensions between civil protection and Red Cross, occasional tensions with the heads of the different entities, and difficulties in identifying who the région can work with regarding the education of risk information</p>	<p>Transcript F-10 Deputy Departmental Director (DDT 05), F-11 Director (SDIS Barcelonnette), F-12 Mayor of Jausiers, F-13 Deputy for Roads (General Council of Alpes-de-Haute-Provence), F-19 Former President of Civil Protection for Alpes-de-Haute-Provence, F-1 Geologist (BGRM), F-20 Mayor of Faucon de Barcelonnette, F-22 Head of Group & Head of Center Departmental Fire and Rescue Service (SDIS 04), F-3 Engineer for Syndicate (Ubaye flood protection)</p> <p>Transcript F-19 Former President of Civil Protection for Alpes-de-Haute-Provence, F-24 Head of Operations, Service for Major Natural Risks, Direction for Development and Housing, Provence-Alpes-Côte d'Azur Region</p>

Table 11.3: (continued)

Indicator	Traffic Light Output (G/Y/R)	Evidence Base
<p>(3) Actors (especially public authorities) are held accountable for their respective roles and responsibilities through monitoring and reporting as well as incentives.</p>	<p>Green: evidence of a number of monitoring and reporting examples across different authorities and levels as well as liability mechanisms to ensure local level is held accountable</p>	<p>Transcript F-11 Director (SDIS Barcelonnette), F-13 Deputy for Roads (General Council of Alpes-de-Haute-Provence), F-15&15a Superior Technician (RTM), F-23 Head of Urbanism Service and Head of Service for Environmental Risks (DDT 04), F-3 Engineer for Syndicate (Ubaye flood protection), F-9 Private Planning Firm, F-26 Private Planning Firm, F-18 Leader of Environmental Assessment Plans and Programs Division, (DREAL), F-21 Consultant (Environmental Studies and Guidance), F-22 Head of Group & Head of Center Departmental Fire and Rescue Service (SDIS 04)</p>

Table 11.3: (continued)

Indicator	Traffic Light Output (G/Y/R)	Evidence Base
<p>(4) Check-ups such as reviews, monitoring and maintenance exist in terms of implemented actions, measures and systems. (also supported from first 5 interviews)</p>	<p>Green: many examples exist for monitoring and maintenance of implemented measures and natural systems (e.g. for glacial flooding and avalanches) as well as for plans such as the PPRN and the PLU Yellow: PPRN must be revised and updated regularly especially after an event (should be automatically updated in this case) but this is not a simple procedure and requires a lot of time and funding</p>	<p>Transcript F-10 Deputy Departmental Director (DDT 05), F-13 Deputy for Roads (General Council of Alpes-de-Haute-Provence), F-15&15a Superior Technician (RTM), F-18 Leader of Environmental Assessment Plans and Programs Division, (DREAL), F-19 Former President of Civil Protection for Alpes-de-Haute-Provence, F-20 Mayor of Faucon de Barcelonnette, F-24 Head of Operations, Service for Major Natural Risks, Direction for Development and Housing, Provence-Alpes-Côte d’Azur Region, F-26 Private Planning Firm, F-7 Private Planning Firm, F-8 Barcelonnette Municipality First Deputy, F-9 Private Planning Firm, F-6 Head of Local Development (Mercantour National Park) Transcript F-1 Geologist (BGRM), F-23 Head of Urbanism Service and Head of Service for Environmental Risks (DDT 04), F-5 Barcelonnette Municipality Deputy for Culture, F-9 Private Planning Firm)</p>
<p>(5) Maintenance of structural mitigation measures is taken into account by relevant authorities. (FROM FIRST 5 INTERVIEWS)</p>	<p>Red: although it is legally required that the dikes be checked every five years, many villages are in danger because there are hundreds of kilometers of dikes that are old, not maintained, and there are inadequate funds to provide needed maintenance or expropriate at risk properties</p>	<p>Transcript F-12 Mayor of Jausiers, F-8 Barcelonnette Municipality First Deputy, F-10 Deputy Departmental Director (DDT 05))</p>

Summary of Accountability

1. In general, regulations concerning risk are clear; however, issues presented include the perception that there are too many laws and that these can be quite complicated. For example, concerning the PPRN, the law is clear in terms of what areas are defined as

red (dangerous), blue (partially dangerous), and white (not dangerous); while at the same time the law governing this plan is considered difficult and complicated to change. Of note is also the outcome of these procedures, in that, for example, there are neighboring communes which have on one side of the border a red designation and on the other side blue. It is normally not possible that the administrative limit forms the boundary of different levels of risk.⁴ With regard to too many laws, it is not an easy task to keep track of new legislation. The sheer number of laws is also perceived to generally make carrying out these laws difficult for individual communes, which is in part why there are greater efforts taken to work at an intercommunal level.

There are also many laws for risk prevention, which are also stated as being clear. However, the only part of the law that has not been clear is that the public data is not so public as described in the statement that "in fact everything is very private", which is why the BGRM is using an online platform to make information more public (see Transcript R-1 Geologist (BGRM)).

2. Responsibilities are quite well-defined and there are no problematic overlaps between rescue authorities as well as between administrative authorities (across different vertical levels as well as within same, horizontal levels). Even for those authorities working in the same sector, the division of work and clarity of responsibilities works well in practice. Examples of this include:

- no problematic overlaps exist between the Syndicat Mixte and the RTM even though there are some tasks they have in common like projects along the river
- the RTM has some similar activities in comparison to the BRGM; however, the RTM is much more local and the BRGM is glad that there is a local entity because the BRGM often works at a more macro scale (would take them much longer to physically even get to the local level and communes)
- there is no overlap between the mayors, the Sub-Prefect, and the prefect and there is a good chain of information and decision making because the information is given to the sub-prefecture and the Sub-Prefect determines the priorities⁵
- there is no overlap between rescue authorities as each has defining characteristics, for example, the fire department is tasked with general rescue, while the PGHM

⁴ However, this is not necessarily the fault of assessment authorities such as the RTM, as this work can be influenced by local administration in terms of what ultimately appears on the map and what delineations are made.

⁵ The local administrative informant stated that it is good to have one body who guides the whole process; because when each commune tries to do something individually for themselves, the outcome is not as good.

(Peloton Gendarmerie de Haute Montagne) works on mountain rescue, the gendarme manage the roads and traffic, while the Conseil Général and the Service du Route are responsible for cleaning the road

- no overlap or problem exists between the firemen and the civil protection, as the relationship and division of responsibilities works very well between these two actors
- there is also no overlap with the SDIS and the responsibilities of the commune and similarly no conflict between the SDIS and the DREAL, as it is understood with the latter that the SDIS prevent and protects, while the tasks of the DREAL are more technical in nature

The well-defined differentiation examples above also enable actors to help each other in their responsibilities. The few exceptions to this general status are: some tensions or conflict (though stated as not problematic) between the civil protection and the Red Cross; occasional tensions with the heads of the different entities, but with those working in the field often there is no problem; and difficulties in identifying who the région can work with regarding the education of risk information because there is not a specific sector for risk education. Regarding the last point, the région tries to help the communes to have funding for risk education efforts like the DICRIM as communes are often too small to provide funding for this.

There are, furthermore, a number of documents defining and guiding roles and responsibilities of actors involved in risk including: DDRM (Le Dossier Départemental sur les Risques Majeurs), which addresses who covers the risk and by which means, gives an analysis of the risk in terms of these means including especially resources and their purpose of use; and the SDACR (Schéma Départemental d’Analyse et de Couverture des Risques), which defines the operational response for the risk.⁶

3. Evidence of a number of monitoring and reporting examples was found including:

- structures for evaluation in place for the different levels of the fire department led by the person in charge, or “Chef” of that level who evaluates the activities (although often these "chefs" could evaluate the activities of the lower levels, they do not)
- the work of the Syndicat Mixte, is evaluated by the water authority (the SDAGE (Schéma Directeur d’Aménagement et de Gestion des Eaux) for the Rhône-Méditerranée Basin)

⁶ Specifically includes: how many firefighters and where, the different trucks used for different purposes, e.g. for forest, for technical and chemical incidences, ambulances for transporting people, as well as the means by which to respond to risks and the operational protocol.

- the DREAL (Directions Régionales de l'Environnement, de l'Aménagement et du Logement) checks the quality of the environmental assessments and that projects from the communes, or the intercommunal level, or the départements are not situated within a risk zone
- environmental evaluations check if the PLU respects the PPRN in terms of risk as part of protecting the environment
- SDIS checks the PCS to make sure there is no conflict or mistake
- The DDT checks that the process for the elaboration of the PPR is done well (that the study is conducted properly, the finalization of the document, the approval of the prefect and the correct date
- in issuing building permits the Prefect checks if what the mayor will do is legal and ensures that the elaboration of the PLU properly integrates risks
- a review of the objectives of the RTM and fulfilment of their mission conducted with the state government every five years to track progress
- reviews conducted by the RTM on the studies completed by private consulting offices for the creation of the PPRNs as well as updates to these and the PLUs

On occasion, advices and additional studies are required or consulted for additional verification, such as the request and provision of studies from consulting offices to provide another advice, for examples, when a property owner does not agree with advice given by the RTM (although often their advice is taken). In contesting advice of the RTM, this can also go to a tribunal and a judge determines the outcome. Another key issue is personal liability which holds authorities like mayors legally liable (and could even go to prison) for consequences that occur in the case that the mayor has permitted construction in a known risky area. This is held similarly for public buildings not built according to specifications (although the construction company shares liability). If the mayor acts against the advice of the consulting office, for example in the case that the consulting office conducting the study states that an area is too dangerous to build, but the mayor still permits building, the office can have the mayor sign a document stating that the mayor was warned of the risk, but still issued the permit. This helps release the consulting office from liability should anything occur (e.g. event occurs). In the case that a commune does not have the finances (e.g. a very small commune with few resources) to pay for the proper studies, they can sign over responsibility for permitting construction to the state and then the state is responsible and liable. For mayors, it is better to have a PPR to say that according to the PPR an area is not buildable. Although they can be attacked by someone who challenges this, without the PPR the mayor is liable for everything. In the case of conflicting advices (RTM states an area is too risky while consulting firm has contrasting advice), the mayor still has to decide which advice to follow but has an interest avoiding liability. However, if

there is no official (legally binding) document that states the risk is too high, the person can challenge this and go to court. If the court permits the construction and something happens (e.g. landslide) then neither the mayor nor the consulting agency is liable.

4. The responsibility for the monitoring of mitigation works is the responsibility of the mayor. However, at the regional level there is some oversight with regard to funds that are requested for projects.⁷ The state (but not always the same service) monitors the measures that are put into place as measures for security and protection are controlled by the state. This is held similarly for studies that deal with risk that are ordered by the municipality. These are controlled by the federal state because it is considered a matter of life and death and, therefore, assessment of the risks must be done very well. For construction permits, checking that the building is built according to permitting requirements falls within the purview of the mayor for post-construction monitoring. The RTM is the authority (in-practice) who evaluates the mitigation measures such as dikes and dams and it is the mayor who pays and is responsible for these structures. This also includes checks the RTM performs every winter for avalanche risks. Workers from the Conseil Général additionally check each day for potential avalanches. The RTM also checks the glacial lake each year to determine if there is any risk of a GLOF (glacial lake outburst flood). For projects and works involving the river, the DDT and the responsible water authority for that body of water check and evaluate the completion of these works. Environmental associations (which are often local) can lodge complaints regarding projects that are planned in environmentally sensitive areas, and the prefect can provide a further check on the project’s legality.

Regarding maps and plans, a number of examples exist for continued monitoring and updating as well as some issues. Issues include that new maps and updates should but are not automatically generated after an event occurs as there must first be a budget in order to do this. Whenever there is an event, the local municipal authorities keep record of this and add it to the historical events map. The PPRN is changed either with a new law or an event or in the case that measures are put in place to reduce the risk, but this is not a simple procedure. Although the PPRN must be revised regularly, it is a question of after how much time. Normally, when one specific part of the PPRN is revised the entire PPRN is revised because it is important to take into consideration the entire territory. When a planning firm work on the PLU and they notice that there is a problem (e.g. that there is a landslide but there this is not noted on the map) then they contact the administration to

⁷ After the mitigation measure is done, they have to prove that is done well otherwise they might not receive money (the funds are given after the completion of the project).

correct the map.⁸ For the PLU, every three years it is obligatory to evaluate the plan's objectives against the realization of these objectives, and then make adjustments accordingly.

5. It is legally required that the dikes be checked every five years (national law) and some structural measures have been improved to ensure that, for example, dikes can support a 100 year return period flood. However, many villages are in danger because there are hundreds of kilometers of dikes that are old and are not maintained. There is not enough money for maintenance and there is not enough money for the authorities to expropriate homes that are located in risky areas. The costs for such maintenance range in the tens of millions of euros, and the population of a given commune along the valley that is at risk can be as few as 1000 persons or less. For example, in Jausiers a dike was improved; and an embankment was raised to withstand a 100 year event at 325 cubic meters per second (the mayor flood in 1957 was 257 cubic m/sec.). The commune wanted to continue but had insufficient funds.

Participation (FR)

For participation, defined as: **Stakeholders (including the local community) are involved through consultation or through higher forms of participation integrating local knowledge through means such as public projects and events as well as feedback systems in policy implementation**, there are good examples of involvement in terms of consultation activities, especially for public inquiry periods. However, the general public is not directly involved in decision making processes and no evidence was provided to suggest "active involvement". Indirect involvement is present with abilities to volunteer and contribute information and other resources. Some examples of use of local knowledge were present, as well as some trainings for the population. There was insufficient evidence for feedback systems.

⁸ They can also refer to the CIPTM (Carte Informative des Phénomènes Torrentiels et Mouvements de Terrain).

Table 11.4: Participation category and indicator traffic light results

Indicator	Traffic Light Output (G/Y/R)	Evidence Base
<p>(1) The community is involved and is encouraged to be involved in consultation activities featuring a wide range of stakeholders as well as a focus on both prevention and response.</p>	<p>Green: good example of involvement of the public in past projects (BRGM) to understand perception, several examples given for public inquiry periods for public consultation</p> <p>Yellow: some issues that more public consultation means more complex and longer process, issue that people are involved in these processes only when it pertains to their individual interests (e.g. with zoning), in some cases public not consulted but more focus placed on consulting specialists</p>	<p>Transcript F-15&15a Superior Technician (RTM), F-1 Geologist (BGRM), F-23 Head of Urbanism Service and Head of Service for Environmental Risks (DDT 04), F-25 Former Head of Natural Risks Projects, Grontmij Environment & Infrastructures (private planning firm), F-7 Private Planning Firm Transcript F-13 Deputy for Roads (General Council of Alpes-de-Haute-Provence), F-15&15a Superior Technician (RTM), F-25 Former Head of Natural Risks Projects, Grontmij Environment & Infrastructures (private planning firm)</p>
<p>(2) Stakeholders (including the public) are “actively involved”, or at least are enabled to be “actively involved”, via two-way communication as well as both bottom-up and top-down pathways.</p>	<p>Yellow: general population not involved in the decision-making processes for risk management and assessment aside from providing information (no “active involvement”), although ability exists to volunteer and to contribute resources, reasons for hesitation in enhancing involvement given</p>	<p>Transcript F-11 Director (SDIS Barcelonnette), F-12 Mayor of Jausiers, F-14 President of the Sabença Association, F-16 Curator of Barcelonnette Museum, F-19 Former President of Civil Protection for Alpes-de-Haute-Provence, F-20 Mayor of Faucon de Barcelonnette, F-3 Engineer for Syndicate (Ubaye flood protection), F-5 Barcelonnette Municipality Deputy for Culture, F-8 Barcelonnette Municipality First Deputy</p>

Table 11.4: (continued)

Indicator	Traffic Light Output (G/Y/R)	Evidence Base
(3) Efforts to raise awareness and educate the population through means such as public projects and events about DRR exist, especially those which pay attention to children and people in high risk areas.	Green: evidence of trainings and exhibitions held by some authorities enable educational efforts and awareness building, with some good examples explicitly addressing children Yellow: some authorities have no direct link to public trainings and education as this is not the focus of their responsibilities, some local administrative authorities do not provide additional trainings with the public aside from informational handouts	Transcript F-12 Mayor of Jausiers, F-19 Former President of Civil Protection for Alpes-de-Haute-Provence, F-24 Head of Operations, Service for Major Natural Risks, Direction for Development and Housing, Provence-Alpes-Côte d'Azur Region, F-8 Barcelonnette Municipality First Deputy, F-10 Deputy Departmental Director (DDT 05) Transcript F-20 Mayor of Faucon de Barcelonnette, F-22 Head of Group & Head of Center Departmental Fire and Rescue Service (SDIS 04), F-2 Director (RTM)
(4) Local knowledge including practical experience is used in decision-making and enables bottom-up input.	Green: in contrast to the “yellow” evidence, some examples found that local knowledge of the territory can be used to replace lack of expertise especially but not limited to time of crisis (e.g. identifying problem areas and assembly points), if counting local knowledge from local specialists (RTM) then high use of local knowledge Yellow: example given that planners from private firms can and should use historical, local knowledge (though this is sometimes not taken into account)	Transcript F-3 Engineer for Syndicate (Ubaye flood protection), F-8 Barcelonnette Municipality First Deputy, (Additionally: general observation from researcher from preliminary and primary fieldwork) Transcript F-26 Private Planning Firm
(5) Feedback systems exist enabling the ability to receive input on policy implementation.	Insufficient evidence to identify patterns or make key point conclusions	Not applicable

Summary of Participation:

1. At the individual level, people who get involved in consultation activities for the PPRN, for example, tend to do so because of personal interests but not for the collective good (most attend particularly when zoning is delineated). When a PPRN or a PLU is being created, there is a person (sometimes referred to as an investigator) nominated by the prefect who is at the mayor's office and is there in addition to the public meeting for people to

provide their comments, interests, preferences, and grievances. This follows similarly for the process of proposed projects. For a project to be implemented there is a public inquiry period for one month in which members of the public can come to a commission investigator. The investigator presents the project to the administration and to the inhabitants and receives applications for grievances. The investigator synthesizes and gives an advice on these grievances. The state ultimately decides how to act on the presented grievances (after considering information from the consulting offices and the investigator). This kind of consultation is important in general in order to have public acceptance and understanding, especially of the PPRN and PLU. The downside to having more people involved in the beginning of the process means that you tend to have more potential conflicts and issues that people bring up which must be (legally required to be) considered and can prolong the process.

The public is consulted also in some projects such as past projects of the BRGM in order to understand the public perception of risk. However, in other lines of work the public is not consulted or involved; for example, in the management of the work of the Conseil Général (for their work, they contact specialists such as the RTM).

2. The general population is not involved in the decision making processes for risk management and assessment aside from providing information (no “active involvement”). For example, in the case of Jausiers, the mayor sent out information to the population in preparation of their PCS to ask the people if there are any elderly or handicapped persons in their homes and if they have the ability to have extra space for people in their home. People can also get involved indirectly through reporting information to the RTM and the fire department, and directly through volunteering, for example, with the civil protection and by donating resources in the case of emergency. During crisis, the mayor as well as the prefecture can decide to involve local businesses and persons.

Hesitations presented in potentially including the public to a greater extent in decision-making include: lack of expertise and training on the part of the public, potential prolongation of decision-making, enhanced complexity, less efficient timeframe (although potential benefits of involvement acknowledged if communication well organized), and the current existence of adequate trained personnel.

3. Trainings and exhibitions held by some authorities enable educational efforts and awareness building including:

- exhibitions at local museums (see more information in Openness & Transparency category);

- some training for the population for the lake in Jausiers with the gendarmerie and the fire department
- trainings offered (as a source of revenue for the civil protection), including CPR
- some trainings with school children for a simulation of an earthquake exercise for the whole department
- example at the Regional level for educational activities with the public include the Risk PACA (Provence-Alpes-Côte-d'Azur) platform
- good example of educational effort from the DDT with 3D space using Google Earth that they have created so that children can see the risks, place items in the landscape like houses, villages, roads, etc. and hopefully transfer this information to parents at home

Some authorities, however, do not have a direct link to the public in terms of trainings and education as it is not the focus of their responsibilities (e.g. the SDIS 04 and the RTM). In some cases, at the local level no additional trainings with the public from the municipal authorities exist aside from the handing out of information.

4. An example was found that planners from private consulting firms can take local knowledge and especially historic data into account in their assessment. For example, one can use an historic register about the province regarding avalanches and destroyed homes and consult people in the villages (especially the elderly) who can give very precise historic information. However, a critique presented here is that sometimes the local knowledge (especially historical knowledge) is not taken into account in the reports of consulting offices hired to conduct an assessment and that these can sometimes even go against the risk and hazard-related local knowledge that provides a very useful and often very reliable source of knowledge. In contrast, some examples found that local knowledge of the territory (e.g. from the mayor and the people of the commune) can replace a lack of expertise in the case of crisis because these people are familiar with where the problems are. Similarly, information from the commune can be used to determine where to put people in the case of emergency. The municipalities are also so small in size and in available personnel that for reporting information, such as the problem of a full check dam, is sometimes done by the population instead of by technicians. If one counts the local knowledge provided by the RTM, and not only information provided by the public, then this provides a key and very important example of how local knowledge is integrated into all facets of information used in risk management and assessment.

5. For this indicator, there was insufficient evidence to identify patterns or make key point conclusions.

Strategic Vision (FR)

With respect to Strategic Vision, defined as: **Stakeholders work toward a future goal that is sustainable, considers both short and long term foci, and integrates DRM into policy planning and programing**, some indicators garnered very limited evidence. Although some key points could be made including an increased consciousness of risks by public authorities, supported by scientific input at the local level, there is at the same time concern and critique regarding the interest of officials in protecting the environment. There is evidence of some positive encouragement in working toward more long term (as well as preventative) focus. There is also evidence of common priorities found in: educational efforts (especially for children), encouraging continuation of local knowledge, in maintaining greater preventative focus, working at the intercommunal level, and in upkeep of structural measures. Several structures for future goal orientation were found especially in planning and development documents such as the PLU, POS, PADD, and the Stratégie Barcelonnette 2020, with one positive example from the EU level with Natura 2000.

Table 11.5: Participation category and indicator traffic light results

Indicator	Traffic Light Output (G/Y/R)	Evidence Base
(1) Goals toward realizing this vision include integrating DRM into policy, planning and programing across sectors, targeting vulnerability reduction and local capacity strengthening.	Green: although limited evidence, positive indication of public authorities at the local level having a “good consciousness” of risks in the area, especially support by scientific input	Transcript F-4 Barcelonnette Tourism Office
(2) The vision and its policies concerning risk and vulnerability reduction are sustainable (follows according to the sustainable development principle), especially for flood risk management policies.	Red: also limited evidence, very general objective expressed through need for officials to have more interest in protecting the environment	Transcript F-21 Consultant (Environmental Studies and Guidance)

Table 11.5: (continued)

Indicator	Traffic Light Output (G/Y/R)	Evidence Base
<p>(3) Strategies follow a particular timeline that includes short and long term foci that is positively perceived by both authorities and the public.</p>	<p>Green: for flood risk management policy focus is to address 50 and 100 year events (considered long term); it is legally required that authorities use 100 year return periods, stated as good for protecting population, long term also encouraged through actors (e.g. RTM) who remain in place longer than fixed term elected offices as well as plans that are often held in effect for a long time</p> <p>Yellow: some actors have only a short term focus as their mandate is to provide immediate help</p>	<p>Transcript F-12 Mayor of Jausiers, F-2 Director (RTM), F-3 Engineer for Syndicate (Ubaye flood protection), F-5 Barcelonnette Municipality Deputy for Culture Transcript F-19 Former President of Civil Protection for Alpes-de-Haute-Provence</p>
<p>(4) There exist the same or similar priorities within the overall strategy or activities of various actors (from Risk Gov. Deficits not policy docs).</p>	<p>Green: Examples of a number of common priorities exist including: educational and knowledge goals (especially for children and knowledge of the valley), continuing improvement toward more preventative focus, encouraging greater intercommunal efforts and organization, and upkeep of structural works (especially infrastructure) as well as efforts from the regional level of sharing visions across levels</p>	<p>Transcript F-10 Deputy Departmental Director (DDT 05), F-13 Deputy for Roads (General Council of Alpes-de-Haute-Provence), F-14 President of the Sabença Association, F-1 Geologist (BGRM), F-15&15a Superior Technician (RTM), F-22 Head of Group & Head of Center Departmental Fire and Rescue Service (SDIS 04), F-24 Head of Operations, Service for Major Natural Risks, Direction for Development and Housing, Provence-Alpes-Côte d'Azur Region, F-2 Director (RTM), F-3 Engineer for Syndicate (Ubaye flood protection)</p>
<p>(5) There is evidence of a structure based on goal orientation for realizing a future vision (FROM FIRST 5 INTERVIEWS).</p>	<p>Green: Structures for realizing future goal orientation found in some examples of actor monitoring and reporting (see Accountability category for more details), planning and development documents (e.g. PLU, POS, PADD, and Stratégie Barcelonnette 2020), at least one positive example of EU structure (Natura 2000)</p>	<p>Transcript F-15&15a Superior Technician (RTM), F-26 Private Planning Firm, F-8 Barcelonnette Municipality First Deputy, F-9 Private Planning Firm, F-21 Consultant (Environmental Studies and Guidance)</p>

Summary of Strategic Vision:

1. Although there was limited evidence for this indicator, there appears to be the perception that the public authorities have a good conscience about the risk and the environment, which is especially supported and has been improving through efforts of scientists that come often to the valley to study different subjects (e.g. mudflow, flooding, sometimes earthquakes, etc.). This was also stated as being very particular for this area and if one goes 100 km south, this would not be the same situation.

2. Also limited in evidence, with respect to sustainability, there is an almost contrasting perspective presented in comparison to evidence supporting Indicator 1. The very general objective expressed in trying to consider a more sustainable approach into environmental issues would be that the elected officials take into account these issues not because they are required to, but because they want to protect the environment, and that the need for this supports the requirements in the first place. The issue communicated is that elected officials only consider the environment because they are obliged to but not because they have an interest in this and, if they had an interest, it would be a better climate to work in for environmental assessment.

3. The focus on a long term versus a short term timeline appeared to depend on the tasks of the actor, how long they hold their position as well as legal requirements. For example, there is not a long term goal for the civil protection because their work is to provide immediate help to people, especially at the social and psychological level. In general, for flood risk management policy, the focus is to address 50 and 100 year events (this is considered long term). However, the extent to whether or not there is a long versus a short term focus depends on the elements at risk. For example, in Jausiers it was stated that the 100 year return period should be used in order to protect the population against flood. Legally, authorities are required to have a longer vision that considers events with 100 year return periods. The long term focus is also encouraged by those authorities who remain in office for a longer period of time (such as the RTM technicians) as opposed to those authorities who are elected for a fixed term. Additionally, even though elected officials change regularly, once a plan is made it is common that this stays in effect for a long time.

4. Some common priorities include informing and educating the population, especially children (e.g. the priorities of the DDT), and encouraging continuation and education of the knowledge of the Ubaye Valley (e.g. activities of L'Association Sabeça de la Valéia). Other priorities appeared to be a general progress in a shift from reactive risk management to a longer term, preventative risk management focus in the last 10 years (some extend this back to the 1990s). At both the local and the regional level a common goal is also to encourage more activities and general organization at the intercommunal scale, especially

in attempting to realize the construction of mitigation measures, more effective territorial planning, and the ability to provide early warning systems at the local level. Some other common goals are more resource based and include: for example for the SDIS 04, having a map and model for estimating fire expansion against elements at risk; for the RTM to complete and maintain structural works similarly to the Conseil Général; and the mayors, who wish to take care of the aesthetics of the communes (e.g. streets with flowers, happy inhabitants), but also the upkeep of infrastructure such as roads and bridges. One other example is found in the ability and efforts of the régional level (within the Service for Major Natural Risks) to work with all levels from the state (national) down to the commune level and to bring the vision of each level to the other levels.

5. Structures for realizing future goal orientation can be found in some of the examples of monitoring and reporting of actors' activities identified in the Accountability category, specifically such as the regular updates and checkups of the RTM with the state to ensure goal orientation is on track. Other examples are found in the many different documents for planning and development including: the PLU and the POS (Plan d'Occupation des Sols), which both guide what will be developed in the future at the local level; the PADD (Plan d'Amenagement et Developpement Durable), which marks an improvement in terms of future planning in that uses are defined with representatives and in agreement with the population for a 10 year period, setting social, economic and ecological goals; and the Stratégie Barcelonnette 2020, which is a vision for the base of the PADD and targets what is desired for the municipality and what are the objectives in 15 years' time. Additionally, examples were mentioned of structures from the EU level, particularly those that are good for protecting species and encouraging a more global urban vision (for example, through Natura 2000).

Effectiveness (FR)

Effectiveness, defined as: **Disaster risk management frameworks consist of efforts which are flexible, and enable the ability to achieve strategy objectives and end-goals**, yielded insufficient evidence for the first indicator, and some (although relatively limited) evidence for the third indicator to indicate general perception from a community leader perspective that authorities appear well-prepared and capable especially during an event. EWS were generally stated as good and working well for flood and landslide, although there were some limitations (e.g. limited lead time) and potential improvement through greater intercommunal scale efforts. Issues were expressed with high frequency notifications and ineffectiveness of road closure systems. Much evidence was garnered for respect to rule of law, with both positive and negative examples but an overall perception that authorities generally adhere to legal requirements. For flexibility (no evidence with redundancy), laws were generally stated to be quite restrictive although both positive and

negative examples of consequences of this were given including the need for laws made at the national level to be more flexible according to the type of territory that must be managed.

Table 11.6: Effectiveness category and indicator traffic light results

Indicator	Traffic Light Output (G/Y/R)	Evidence Base
(1) Assistance provided (e.g. in past experiences) helps achieve overall or end goals.	Insufficient evidence to identify patterns or make key point conclusions	Not applicable
(2) Early warning systems fulfil their purpose by alerting appropriate bodies to disasters and threats.	<p>Green: generally, EWS are stated as working well, especially for flood and landslide</p> <p>Yellow: in some cases, possible to have a forecast and idea of lead time but not when event happens too quickly (EWS is then limited); efforts to improve EWS for flooding through intercommunal scale; many EWS exist and depend on the hazard</p> <p>Red: EWS system called GALA (information given to mayors every time there might be a problem) has too high a frequency and is sometimes disregarded, ineffectiveness of EWS for road closures, some uncertainty expressed in meanings of sirens at local level</p>	<p>Transcript F-11 Director (SDIS Barcelonnette), F-14 President of the Sabença Association, F-17 Former President of the Sabença Association & former First Deputy of Barcelonnette Municipality, F-6 Head of Local Development (Mercantour National Park)</p> <p>Transcript F-15&15a Superior Technician (RTM) F-19 Former President of Civil Protection for Alpes-de-Haute-Provence, F-5 Barcelonnette Municipality Deputy for Culture, F-12 Mayor of Jausiers</p> <p>Transcript F-4 Barcelonnette Tourism Office, F-6 Head of Local Development (Mercantour National Park), F-3 Engineer for Syndicate (Ubaye flood protection)</p>
(3) Authorities, individuals, and communities are well-prepared.	<p>Green: some evidence suggests (especially from third party observers and not the authorities themselves) that local authorities are well prepared and know what to do in the case of an event</p>	<p>Transcript F-14 President of the Sabença Association, F-3 Engineer for Syndicate (Ubaye flood protection)</p>

Table 11.6: (continued)

Indicator	Traffic Light Output (G/Y/R)	Evidence Base
<p>(4) Flexibility and redundancy are demonstrated and enable a response to adapt to change while still ensuring capacities to meet goals (e.g. through updating policies in response to change) (also from Risk Governance Deficits)</p>	<p>Green: level of strictness for PPRN is helpful in preventing the ability to build everywhere, also provides good and clear tool for planners and other authorities, some more flexible examples can be found in the use of construction laws to diminish risk and enable some building, some potential for exceptions in interpretation of law through DDT, statement that flexibility and restrictiveness combination ensure that mistakes are not made while the non-obligatory studies provide an evidence base and enhance knowledge</p> <p>Yellow: PPRN is generally not flexible, while the PLU is understood to have some flexibility</p> <p>Red: to enable basis for greater flexibility, investment needed in studies especially for small communes but normally not adequate funding in small areas (e.g. hamlets) to realize these studies, strictness of PPRN is disincentive for authorities to update or make new PPRN, many laws perceived generally quite restrictive, (e.g. laws made at the national level often too general and should be more flexible according to the type of territory)</p>	<p>Transcript F-10 Deputy Departmental Director (DDT 05), F-13 Deputy for Roads (General Council of Alpes-de-Haute-Provence), F-15&15a Superior Technician (RTM), F-23 Head of Urbanism Service and Head of Service for Environmental Risks (DDT 04), F-7 Private Planning Firm</p> <p>Transcript F-10 Deputy Departmental Director (DDT 05), F-9 Private Planning Firm, F-26 Private Planning Firm</p> <p>Transcript F-12 Mayor of Jausiers, F-13 Deputy for Roads (General Council of Alpes-de-Haute-Provence), F-15&15a Superior Technician (RTM), F-20 Mayor of Faucon de Barcelonnette, F-23 Head of Urbanism Service and Head of Service for Environmental Risks (DDT 04), F-2 Director (RTM), F-5 Barcelonnette Municipality Deputy for Culture, F-7 Private Planning Firm, F-3 Engineer for Syndicate (Ubaye flood protection)</p>

Table 11.6: (continued)

Indicator	Traffic Light Output (G/Y/R)	Evidence Base
<p>(5) Regulatory frameworks are upheld and achieve their purpose in practice (FROM FIRST 5 INTERVIEWS) (also from Risk Governance Deficits)</p>	<p>Green: general understanding that authorities will adhere to the many codes and regulations put in place, including building restrictions and prohibition from building in risky areas (some specific examples included adherence to PPRN, PLU, and PCS requirements as well as environmental evaluations)</p> <p>Yellow: recommendation for improvement given that each municipality should have a PPRN because this is useful but not all municipalities make use of this information (triangulation of statements)</p> <p>Red: potential issues in achieving purpose in practice include lack of proper studies, difficulty in prohibiting bicycles on certain roads and ensuring appropriate barrier function, some inappropriate granting of building permits, some construction guidelines not adhered to for small buildings, risk zones changes over administrative lines, buildings not in compliance with 1.5m regulation in PLU</p>	<p>Assessment Plans and Programs Division, (DREAL), F-20 Mayor of Faucon de Barcelonnette, F-23 Head of Urbanism Service and Head of Service for Environmental Risks (DDT 04), F-7 Private Planning Firm, F-9 Private Planning Firm, F-13 Deputy for Roads (General Council of Alpes-de-Haute-Provence)</p> <p>Transcript F-18 Leader of Environmental Assessment Plans and Programs Division, (DREAL), F-24 Head of Operations, Service for Major Natural Risks, Direction for Development and Housing, Provence-Alpes-Côte d’Azur Region, F-26 Private Planning Firm, F-9 Private Planning Firm</p> <p>Transcript F-18 Leader of Environmental Assessment Plans and Programs Division, (DREAL), F-17 Former President of the Sabença Association & former First Deputy of Barcelonnette Municipality, F-12 Mayor of Jausiers, F-24 Head of Operations, Service for Major Natural Risks, Direction for Development and Housing, Provence-Alpes-Côte d’Azur Region</p>

Summary of Effectiveness:

1. There was insufficient evidence from which to identify patterns or make key point conclusions.

2. In general EWS tend to work well but with some limitations and exceptions. Especially for flood and landslide, EWS is stated to work well, and is supported by the networks of people who can be called at the local and prefecture levels. Although this tends to work well, a statement was made that the people always want to be alerted as early as possible. The EWS for large events is well known; and for small events, they have the Gendarmes and the fire department. There are also many EWS, which vary depending upon the hazard; for example, there are sirens for landslides in La Valette and for the large dam at the

Lac de Serre-Ponçon; alerts are also given to the population from the tourism office and the ski lift management to not go on roads after snowfall. In some cases, it is possible to have a forecast and have an idea of how much time one has before the event; but in other cases EWS is limited when the event happens too quickly and it is not possible to initiate an alert. There are, however, efforts to improve EWS for flooding by having an EWS at a more intercommunal scale, particularly for evacuation from flood in the Ubaye.

A few other issues and potential limitations were also identified including some uncertainty as to what the sirens mean for the local community. Another is the EWS system called GALA, in which the mayors are called every time there might be a problem, but the frequency is too high so they do not pay attention to this. Tourism authorities would also like to improve their notifications for tourists by getting more information from the authorities from a special forecast system (this they would provide to tourists and people going out to the mountain for hiking). One key problem identified was the ineffectiveness of EWS for road closures, which animals can also trigger by walking by and interfering with monitoring sensors.

3. Some evidence exists that (from actors who are third party observers and not the authorities themselves) that authorities are well prepared, well trained, and have good coordination for local events and that specifically the mayor, fire department, and authorities working in civil security know what to do in case of an event.

4. The PPRN is generally not flexible; while the PLU is understood to have some flexibility and takes less time, complexity, and resources to change in comparison (although there are contrasting opinions as to the extent of this flexibility). How often the PLU changes sometimes depends on the mayor. It is possible to modify this in total or in small parts or certain sectors; however, these plans are for a period of between 10-20 years and are normally relatively stable (meaning can be changed, but often are not). To enable a basis for greater flexibility, investment is needed in studies especially for small communes in order to provide information for the evolution of different constraints. Unfortunately there is normally not adequate funding in small areas, like hamlets, to realize these studies. For the PPR, authorities such as the RTM feel the level of strictness is appropriate, especially as it prevents the ability to build everywhere and provides a good and clear tool for planners among other authorities. However, other authorities (and stated also the population) feel this is too restrictive, can cause conflict, and at times is an annoyance even though it provides necessary building limitations; and in consequence, some authorities do not want to update or make a new PPRN because it will be more restrictive.⁹

⁹ This restrictiveness does not change even if you build protection works.

Other examples are found aside from planning documents. In general, there are many laws; and these laws are perceived as being quite restrictive, including:

- even in case of emergency, authorities cannot work over their legally mandated hours, otherwise the “chef” or “chief” in charge could go to jail
- if there is a channel where there is no water, even year round, and they need to build a bridge, they still need to create an environmental plan (as if this was a running stream)
- laws are often made at the national level and are too general, and should be more flexible according to the type of territory you want to manage (e.g. a dam built in the plain versus in the mountainous areas will have very different affects but must follow the same regulations)

Aside from the above examples of strictness, some more flexible examples can be found in the use of construction laws to diminish risk and enable some building while benefiting the environment and the ability to request interpretations and potential exceptions through the DDT for specific building projects. Altogether, having both legally binding (inflexible) and informal (flexible) components of the regulatory framework are considered important. This is because the required prescriptions of the PPRN, PLU, among others help ensure that mistakes are not made, while the non-obligatory studies provide an evidence base and enhance knowledge (stated as permitting best knowledge).

5. There is a general understanding that authorities will adhere to the many codes and regulations put in place. Some examples supporting this include:

- with the PPRN, the administration now tries not to grant permits for construction in risk zones (many homes are affected by this) and also use this in preserving agricultural lands and managing urban density
- with the implementation of the PCS local authorities are assisted in knowing what they can and cannot do and have better knowledge of existing problems
- the prescriptions in the PLU are effective in prohibiting building in risky areas
- use of environmental evaluations has been effective in delineating specific zones and helping planners to determine what areas can be used with respect to the risks

The need for having more PPRNs (one for each municipality if possible) was stressed as this is considered a good tool by some actors, especially as this assists in enforcing and achieving the purpose of regulations for risk management in general (e.g. avoidance of

building in risky areas).¹⁰ Some examples, however, were provided, indicating potential issues with regulatory frameworks in practice, including:

- sometimes due to lack of funding or lack of competencies some studies done for the commune level by the state and consulting firms do not cover the full territory resulting in poor quality risks assessment in the impact studies, which are important especially when there is no PPRN (in practice communes do not always order the studies they need)¹¹
- occasionally risk zones change over administrative lines, which should not be possible if this is an accurate representation of risk
- a regulation in the PLU (and not possible to change) is if a dike is built, homes must be 1.5 m above ground; however, there is not enough money to expropriate the homes that are not conforming to the regulation, so there are now two kinds of people (those with homes 1.5 m compliance and those without), and no one checks the latter in practice
- it is difficult to enforce the prohibition of bicycles on certain roads and to ensure protective barriers, in the case of rock falls, work properly
- sometimes building permits are still given when they should not be given
- for larger buildings construction guidelines are typically applied; but for smaller buildings such as homes, this is sometimes not the case although it is still mandatory

The reader is encouraged to note that the long list above does not indicate that effectiveness in terms of adherence to rule of law is non-existent or that the length of this list supersedes the preceding “positive” list. Substantial evidence was gathered in both cases; however, more individual examples were found for the “negative” list; while there was more confluence (or agreement) across different actors on the “positive” list.

Efficiency (FR)

For Efficiency, defined as: **Resources, including time, are not wasted but rather optimized through efforts made at the lowest, most appropriate level within an adequate timeframe and pursuing best practices and technologies**, much of the input is centered on efforts to increase intercommunal organization, with some suggestions of what should be considered at regional level. Insufficient evidence was found for exchange of best practices in terms of efficiency (Indicator 4). Additionally, there is a

¹⁰ If there is no PPRN, this can be a problem. If it does not exist, the mayor must apply the Urbanist Code which is very vague or he or she can simply refuse a building permit request.

¹¹ When making plans at the local level of the commune, some consulting agencies that are making the plans try to keep this process as cheap as possible. The reasons for this include not having the time, money, or interest; and the result is poorer quality in consideration and inclusion of the risks.

general perspective that a pooling of resources is needed amongst the communes to assist in realizing necessary projects. Timing and reaction generally is perceived as good, with helpful close proximity in Barcelonnette to Sub-Prefect decision-makers. For avoiding duplication of work and extra costs, examples were given that hierarchy in decision-making assists overall efficiency; PLU and PPRN should be created simultaneously; and though the PPRN is a good tool, it is expensive and not necessarily suitable for small areas.

Table 11.7: Efficiency category and indicator traffic light results

Indicator	Traffic Light Output (G/Y/R)	Evidence Base
<p>(1) Actions are appropriate and are taken at the most appropriate level, reflecting the subsidiarity principle.</p>	<p>Green: some evidence suggests decision-making made at appropriate level for specific commune in which mayor has knowledge of the commune and fire department and civil protection have knowledge of security & safety Yellow: substantial evidence from both local and higher levels indicates a push for the intercommunal level as the most appropriate level for a range of organizational functions like basic services, general risk management, and planning (efforts underway and progress made towards this goal); suggestions for région level given including having legal power to make the communes work together and for specific issues like accounting for climatic changes, changes in geology to be organized and regulations developed at régional (not national) level</p>	<p>Transcript F-12 Mayor of Jausiers, F-15&15a Superior Technician (RTM) Transcript F-15&15a Superior Technician (RTM), F-18 Leader of Environmental Assessment Plans and Programs Division, (DREAL), F-23 Head of Urbanism Service and Head of Service for Environmental Risks (DDT 04), F-24 Head of Operations, Service for Major Natural Risks, Direction for Development and Housing, Provence-Alpes-Côte d’Azur Region, F-25 Former Head of Natural Risks Projects, Grontmij Environment & Infrastructures (private planning firm), F-3 Engineer for Syndicate (Ubaye flood protection) F-6 Head of Local Development (Mercantour National Park)</p>
<p>(2) Resources are used wisely and sustainably through means such as pooling to ensure optimized and continued use in the long-term.</p>	<p>Yellow: general perspective that resources at the level of individual communes is insufficient and that a pooling of resources is needed to enable completion of necessary projects in the valley (efforts currently underway with Syndicat)</p>	<p>Transcript F-20 Mayor of Faucon de Barcelonnette, (Additionally: general observation from researcher from preliminary and primary fieldwork)</p>

Table 11.7: (continued)

Indicator	Traffic Light Output (G/Y/R)	Evidence Base
(3) Duplication of work and excessive costs are avoided.	<p>Green: general notion that current decision-making hierarchy helps maintain efficiency</p> <p>Yellow: recommendation for creation of the PLU and the PPRN simultaneously (saves time and work and ensures risk research completed also for PLU creation)</p> <p>Red: although PPRN is good instrument, it is expensive and perhaps not best for e.g. smaller areas</p>	<p>Transcript F-5 Barcelonnette Municipality Deputy for Culture</p> <p>Transcript F-26 Private Planning Firm</p> <p>Transcript F-10 Deputy Departmental Director (DDT 05)</p>
(4) Best practices and best technologies are pursued.	Insufficient evidence to identify patterns or make key point conclusions	Not applicable
(5) Efforts are carried out within an adequate timeframe, enabling both information exchange between multiple levels for authorities and first responders, as well as attention given to preventative actions prior to disaster (both from policy and interview transcripts).	<p>Green: Timing and reaction is generally good (even up to the national level), and exchange of information is timely, timing for decisions can depend on physical proximity to decision makers (Barcelonnette benefits from housing sub-prefecture offices), additional strategies (field flooding) have allowed for time to respond</p>	<p>Transcript F-19 Former President of Civil Protection for Alpes-de-Haute-Provence, F-22 Head of Group & Head of Center Departmental Fire and Rescue Service (SDIS 04), F-4 Barcelonnette Tourism Office, F-5 Barcelonnette Municipality Deputy for Culture, F-8 Barcelonnette Municipality First Deputy</p>

Summary for Efficiency:

1. Some evidence suggests decision-making is made at the appropriate level as it concerns an issue of a specific commune in which the mayor has knowledge of the commune and fire department and civil protection have knowledge of security and safety. However, in general, substantial evidence from both local and higher levels indicates a push for the intercommunal level as the most appropriate level for a range of organizational functions. Efforts have been underway and progress has been made toward enhancing the intercommunal level (e.g. actions of the CCVU, the creation of the Syndicat, and the initial development of the PLUI (intercommunal level PLU)). Reasons for these efforts include:

- planning at an intercommunal level would help improve effectiveness of coordination in management against natural risks, especially in remedying lack of coordination between communes in the case of flood
- more intercommunally focused plans like the PLUI are more effective than the PLU (which is on a level below intercommunal) and provide greater coherency in planning for the Ubaye Valley as a whole, especially through discussion of risks at this scale
- the commune level (and especially in rural areas) is too small a level and it would be better to take an intercommunal level for managing key issues including waste water, basic utilities, and especially management of the river as well as facing problems in the case of big events

A supporting example was given that the prefecture originally organized and support the PPRN to better address risks, which would not have been if this was attempted by the individual communes. The région has financial power to improve how the communes work together, and a suggestion was given that it would be a good idea for this level (stated by a régional official) to have legal power to make the communes work together. The regional level was also considered to be most appropriate level for specific issues like accounting for climatic changes, changes in geology, and associated risks. Stress was placed on the need for making region-specific laws that define the handling of these and related issues (as opposed to national level requirements).

2. The general perspective is that there are not enough resources at the level of individual communes and that a pooling of, especially financial, resources would help enable completion of needed projects. This is why is it a good idea to have the Syndicat (at the intercommunal level) to assist in reducing the expense of projects.

3. Although limited evidence was gathered, two examples were given with respect to avoiding duplication of work and excess cost. These are as follows:

- the creation of the PLU and the PPRN simultaneously to ensure that there has been research completed about the risks at the same as the completion of the PLU (saves both time and work)
- the general notion that the current decision-making hierarchy helps in maintaining efficiency by providing clear leadership pathways

One other point made is that, although the PPRN is a good instrument, it is expensive and perhaps not best for all areas (e.g. smaller areas).

4. There was insufficient evidence to identify patterns or make key point conclusions for this indicator.

5. Timing and reaction in the case of an event stated as good (even up to the national level) and generally exchange of information is timely. Timing for decisions can depend also on how close one is in terms of physical proximity to the decision makers; for example, this can depend on proximity to the Sub-Prefect. This is because the Sub-Prefect has to arrive and make decisions; and if one is close, it will not take as long for them to get there. This also depends on the urgency of the situation (if the Sub-Prefect needs to get there immediately or not); however, Barcelonnette has an ideal situation as it houses the Sub-Prefect offices.

To allow for adequate time for response, some strategies can be employed such as allowing fields to flood first and grant more time to react as was done successfully in 2008, which provided an extra three hours to respond.

Equity (FR)

With respect to the category of Equity, defined as: **Strategies do not disadvantage particular groups, but rather encourage intergenerational equity and solidarity through non-discriminatory strategies, especially those assisting vulnerable groups and areas**, there was insufficient evidence for inter-generational equity and a generally well understood issue of vulnerability as primarily a spatial function (location based); although age was a recurrently mentioned factor. There were also general patterns of feeling that the rural, more isolated, mountainous areas are not encouraged and are not as supported by the state as opposed to other, more populated areas. Several good examples exist for strategies to address vulnerable groups, and improvement has been made in efforts to enhance knowledge of the scattered elderly population. Additional issues included need for access to local knowledge networks for especially new inhabitants. Good examples of solidarity, especially from past events, were found. However, this depends on the type of event and if one or multiple communes are affected.

Table 11.8: Efficiency category and indicator traffic light results

Indicator	Traffic Light Output (G/Y/R)	Evidence Base
(1) Adaptation does not disadvantage future generations, reflecting promotion of intergenerational equity.	Insufficient evidence to identify patterns or make key point conclusions	Not applicable

Table 11.8: (continued)

Indicator	Traffic Light Output (G/Y/R)	Evidence Base
<p>(2) Attention is paid especially to those places that are isolated and or have special needs as a consequence of their difficult geography.</p>	<p>Yellow: well understood vulnerability is spatial proximity to hazards (e.g. where people live), efforts made to reach and alert isolated hamlets (although this is sometimes still an issue)</p> <p>Red: feeling that the administration (central state) and Europe do not want the level of hamlet (too risky)</p>	<p>Transcript F-11 Director (SDIS Barcelonnette), F-13 Deputy for Roads (General Council of Alpes-de-Haute-Provence), F-14 President of the Sabença Association, F-15&15a Superior Technician (RTM), F-3 Engineer for Syndicate (Ubaye flood protection), F-5 Barcelonnette Municipality Deputy for Culture, F-6 Head of Local Development (Mercantour National Park), F-20 Mayor of Faucon de Barcelonnette</p> <p>Transcript F-12 Mayor of Jausiers</p>
<p>(3) Strategies pay attention to particularly vulnerable groups (e.g. children, elderly, poor, disabled, populations living in informal and marginal settlements, directly affected, and displaced populations).</p>	<p>Green: solutions to help strategies address vulnerable groups include: state expropriation of land that is too risky, advisory assistance as well as social services for those affected</p> <p>Yellow: key issue with deconcentrated aged population, currently municipalities are gathering and updating information on location of these persons (not an easy task), other potential issues for those who have hazardous occupations (though not stated as direct problem)</p>	<p>Transcript F-10 Deputy Departmental Director (DDT 05), F-14 President of the Sabença Association, F-5 Barcelonnette Municipality Deputy for Culture</p> <p>Transcript F-10 Deputy Departmental Director (DDT 05), F-12 Mayor of Jausiers, F-16 Curator of Barcelonnette Museum, F-17 Former President of the Sabença Association & former First Deputy of Barcelonnette Municipality, F-19 Former President of Civil Protection for Alpes-de-Haute-Provence, F-22 Head of Group & Head of Center Departmental Fire and Rescue Service (SDIS 04), F-15&15a Superior Technician (RTM), F-8 Barcelonnette Municipality First Deputy</p>

Table 11.8: (continued)

Indicator	Traffic Light Output (G/Y/R)	Evidence Base
(4) Efforts and measures employed (e.g. for training and education) are impartial, neutral and non-discriminatory as well as gender and culture sensitive, including for vulnerable groups and to those who are not part of established knowledge networks.	Red: issue new members of the population (e.g. for some who move there for retirement) and tourists do not have access to the local knowledge networks (should improve knowledge base for these groups)	Transcript F-10 Deputy Departmental Director (DDT 05), F-3 Engineer for Syndicate (Ubaye flood protection)
(5) The solidarity principle is encouraged within and outside the affected community through strengthening DRR in especially high risk areas (e.g. using prevention to reduce disparities in protection and ensuring equitable distribution of burdens and impact).	Green: examples of past events (e.g. 2008 flood) demonstrate good solidarity within and beyond local level Yellow: in the case of events help is provided but tends to fade when it is still greatly needed, in the case of one commune affected there is good solidarity but if multiple affected this is not the case Red: general perception that the Ubaye Valley is not such a priority at the Regional level as it is a very rural area with low population (mountain areas tend to have greater need for resources from région than coastal areas)	Transcript F-14 President of the Sabença Association, F-19 Former President of Civil Protection for Alpes-de-Haute-Provence, F-5 Barcelonnette Municipality Deputy for Culture Transcript F-19 Former President of Civil Protection for Alpes-de-Haute-Provence Transcript F-24 Head of Operations, Service for Major Natural Risks, Direction for Development and Housing, Provence-Alpes-Côte d'Azur Region, F-3 Engineer for Syndicate (Ubaye flood protection), F-8 Barcelonnette Municipality First Deputy, F-9 Private Planning Firm

Summary for Equity:

1. There was insufficient evidence to identify patterns or make key point conclusions for this category.
2. It is well understood within this case that vulnerability is a key product of physical location and difficult geographies (spatial proximity to hazards, particularly with where people live). Events can be very localized and whether people live on hazardous territory is considered more important than their social characteristics. Examples of this include:

persons who live under the La Valette landslide, in general for communes like Jausiers and Barcelonnette that are close to the narrowed river, and other communes facing problems with torrents. Vulnerable groups that were especially mentioned and connected to the issue of isolation and difficult geographies included the elderly and people who are located in specific hamlets. These small areas can become completely isolated in the winter and can, in general, be difficult to reach. Efforts are made such as training conducted by civil protection for isolated hamlets, to ensure it is possible (and how) to provide food and basic needs to these areas. Additionally, in the case of alarm, in each hamlet there is a person who has to knock on all the doors to alert people.

Another point related to difficult geography is the feeling that the administration (central state) and Europe do not want the level of hamlet to continue to exist, because they say it is impossible to live there (too much risk).

3. Although there is a general perception that there are no substantial differences among different groups of people in the community aside from physical location in proximity to hazards, other characteristics were also mentioned as factors for vulnerability including: age, including both elderly and disabled (and whether the location is known where the aged and disabled live) as well as children, and occupation (e.g. RTM, ski station workers who start avalanches, people who fix the roads). With respect to the elderly part of the population, nearly all live at home and there is no singular hospital or nursing home in which they are concentrated (over 500 persons over the age of 70 in Barcelonnette). For an evacuation, this can be a problem as it might be difficult to reach all of them, especially those located in isolated hamlets, like Allemand. To remedy this, the municipal offices have been collecting and making a database of this information and try to keep this updated, especially as it is the responsibility of the mayor to know where the vulnerable members of the population are located which is not an easy task.¹² Other solutions to help strategies address vulnerable groups include: state expropriation of land that is too risky to enable the owner to relocate elsewhere, advisory assistance from the mayor’s office for those who are affected, and social services to assist people who have financial, medical, or social problems who have been effected by an event.

4. An issue was found for new members of the population (e.g. for some who move there for retirement) as well as the tourists who do not have the knowledge contained in local knowledge networks (would have to be connected to this). For the tourists, there is not

¹² Specific (extreme) example: two elderly persons (a brother and sister) who lived in an isolated area disappeared for two months. Authorities went to check on them, and found they had died. They had asked not to be helped or visited. The lesson in this example is that it is important to know the location of the elderly; especially because, as in this case, the state cannot simply enter if the location is a private home.

enough time to educate them; because they are only there for a short time. In contrast, more could be done for those who move (more permanently) to the area. Newcomers, therefore represent another potentially vulnerable group; especially because they do not have the mountain culture in terms of experience with the frequency of different events in the area; and nothing is organized for providing this information to these people aside from social networks at the most local level (e.g. chatting with one's neighbor).

5. Both positive and negative key points and patterns in terms of solidarity within and outside affected community were found. With respect to the positive, past examples were provided including the 2008 flood event in Varche (from another department) in which people came from all over France to help. When there is a big event with the flooding of the Faucon people help one another, and in general there is a sense of strong solidarity among the people in the face of an event. However, (and in turning to the negative) assistance starts to fade after the first several days. The problem with this is that the people who are effected really need help a week or two afterward when there is often a lot less help given (e.g. after the emergency responders are gone, the people still have to clean up, get their lives and community back to normal and need help with this, especially the elderly). Additionally, not all zones are affected the same way (also depends on the hazard in question); and if there is, for example, a landslide that affects one commune; then there is good solidarity between the communes (between the mayors of each commune). However, if all communes are affected, which often happens in the case of a flood, this solidarity is not as readily demonstrated.

Another, broader issue, was that money that is distributed from the region takes into account solidarity in distribution to who needs it; but the mountain areas are in need of more funds than the coastal areas because they have limited sources (avenues where the money for projects comes from is from the region only). The perception of local level authorities, furthermore, is that the Ubaye in general is not such a priority at the Regional level (very rural area with low population). This perception is reiterated in the example given of a PPRN not being desired by the Prefect for Saint Paul (a village in the Ubaye), because there are only 200 people there (are 2000 in the high tourist season); and thus, money would be prioritized toward PPRNs for larger communes. This holds similarly for the case of an event, whereby for flooding, Barcelonnette has a smaller population and could be second priority to the flooded areas downstream with greater populations.

Trust (FR)

With respect to trust, the research defines this as: **Interactions between and among public and non-public actors occur based on an assurance (and belief) of mutual reliability, including confidence in capacities of authorities, honesty and**

integrity. Important findings indicate overall there is a good level of confidence (and many times explicitly stated trust) between the public and local authorities. A very strong example is given with the RTM who are also highly appreciated and generally very trusted, with the exception of when the public thinks the advice given by the RTM is too restrictive. There also appears to be a generally good level of trust between the population and higher level authorities, although there is a stronger connection between the population and the local level in comparison to this relationship with the higher levels (the stronger connection and closer proximity encourages greater confidence at the local level). There appears to be confidence between authorities on different vertical levels (although for the latter there is limited evidence) as well as within the same horizontal level; however, some examples are mixed with respect to trust between authorities and consulting firms as well as amongst consulting firms.

Table 11.9: Trust category and indicator traffic light results

Indicator	Traffic Light Output (G/Y/R)	Evidence Base
<p>(1) The public has confidence in the competencies of the local authorities and trusts in the integrity of their activities.</p>	<p>Green: in general, appears to be good level of confidence (explicitly stated trust) between population and local authorities, trust also with emergency response as authorities react quickly when there is an event and rescue plans done well, also trust in new crisis management center at Séolane Barcelonnette Yellow: strong level of appreciation for the RTM, exception only when people think their advice is too restrictive</p>	<p>Transcript F-11 Director (SDIS Barcelonnette), F-14 President of the Sabença Association, F-15&15a Superior Technician (RTM), F-16 Curator of Barcelonnette Museum, F-17 Former President of the Sabença Association & former First Deputy of Barcelonnette Municipality, F-19 Former President of Civil Protection for Alpes-de-Haute-Provence, F-3 Engineer for Syndicate (Ubaye flood protection), F-6 Head of Local Development (Mercantour National Park), F-5 Barcelonnette Municipality Deputy for Culture, F-8 Barcelonnette Municipality First Deputy Transcript F-15&15a Superior Technician (RTM)</p>

Table 11.9: (continued)

Indicator	Traffic Light Output (G/Y/R)	Evidence Base
<p>(2) The public has confidence in the competencies of the higher level (non-local) authorities and trusts in the integrity of their activities.</p>	<p>Green: generally good level of confidence between the population and higher levels Yellow: although there is a good level of trust, population has stronger connection and confidence in local level authorities, good level of trust also for emergency authorities with exception of case in which people asked to evacuate their homes and refuse</p>	<p>Transcript F-14 President of the Sabença Association, F-16 Curator of Barcelonnette Museum, F-17 Former President of the Sabença Association & former First Deputy of Barcelonnette Municipality, F-20 Mayor of Faucon de Barcelonnette, F-22 Head of Group & Head of Center Departmental Fire and Rescue Service (SDIS 04) Transcript F-22 Head of Group & Head of Center Departmental Fire and Rescue Service (SDIS 04)</p>
<p>(3) Authorities within the same horizontal levels feel they can rely on one another and have confidence in each other's abilities.</p>	<p>Green: good level of trust amongst authorities and professionals in general at the same level, exemplary case of the RTM (strong example) Yellow: trust between authorities and consulting firms, as well as amongst consulting firms, is mixed (with both good and bad examples)</p>	<p>Transcript F-11 Director (SDIS Barcelonnette), F-13 Deputy for Roads (General Council of Alpes-de-Haute-Provence), F-17 Former President of the Sabença Association & former First Deputy of Barcelonnette Municipality, F-26 Private Planning Firm, F-2 Director (RTM), F-3 Engineer for Syndicate (Ubaye flood protection), F-9 Private Planning Firm Transcript F-18 Leader of Environmental Assessment Plans and Programs Division, (DREAL), F-1 Geologist (BGRM), F-9 Private Planning Firm</p>
<p>(4) Authorities within different vertical levels feel they can rely on one another and have confidence in each other's abilities.</p>	<p>Green: very limited evidence, but example provided of good level of trust between consulting office and the state, multiple administrative levels, among other institutions they work with</p>	<p>Transcript F-9 Private Planning Firm</p>

Summary for Trust:

1. In general, there appears to be a good level of confidence (and explicitly stated trust) between the population and local level authorities, with specifically mentioned authorities including: the mayor, gendarme, and RTM (particularly stated was that there are two local people at RTM who “know everything”). One reason given for this is that the public

knows that the authorities have skills to manage natural hazards and they know they can rely on the authorities to take care of them. There is still confidence in these authorities because the population trusts in the adherence to the many codes and regulations that are put in place (highlighting a direct connection to Effectiveness with adherence to rule of law).

Examples of this were given explicitly also for emergency and for territorial management authorities. For example, there is a good relationship between local fire department and the local population and a strong level of appreciation for the RTM, with the exception of when the people think their advice is too restrictive. For emergency response, confidence in authorities is also strengthened as these authorities react quickly when there is an event and the rescue plans are done well. There is also trust in the new organization of an emergency management crisis center that is installed at Séolane Barcelonnette.

2. There is also generally a good level of trust between the population and higher level authorities. Similar reasons are given as to why this trust exists, specifically confidence in the abilities of these authorities. However, there is also a common trend that the people have a stronger connection to and potentially higher level of trust in the local level because this level is more visible to the population. In terms of emergency management at higher levels (from the perspective of the emergency managers themselves) there is also a good level of trust between these authorities and the population. This was stated as the case with trust between the population and the SDIS 04, with the exception of when people do not want to leave their homes but are asked to do so.

3. There is a good level of trust amongst authorities and professionals in general at the same level. At the local level this is stated as including the gendarme, the fire department, the mayors and other elected officials as well as the RTM. In cases of emergency there is sometimes a tense environment. However, even in this case and more so in general, there is a good relationship of trust amongst the authorities. The RTM (and especially the local level technicians) provide an exemplary case as most of the time, the advice of the RTM is followed although this is not required as they have both scientific knowledge about the risks as well as through their practical day to day work. They have also been stated as "irreplaceable". This was also reiterated by consulting firms who call the RTM to get advice for specific areas through informal communication.

Trust between authorities and consulting firms, as well as amongst consulting firms, is mixed. In some cases, there is a good level of trust between consulting firms. However, in other cases there is an issue in lack of confidence in some of the consulting work done for specific studies, especially if private offices making the studies create them very quickly, and consequently with lower quality. One other issue is with potential bias in the case that

consulting offices do not work independently from the communes that employ them (e.g. without bias or in making assessments in favor of the wishes of the communes and keep their “clients” happy).

4. Very limited evidence, however, example provided of a good level of trust between a consulting office and the state (even région and prefecture level) and all other institutions that are dealt with after the administrative actors, especially because these offices are able to give a lot of information to the state.

Resources (FR)

With the category Resources, defined as: **Resources are adequately available and exchanged and enable sufficient and or improved capacity for risk management practices including both physical (e.g. money, personnel, and equipment) and non-physical (e.g. time, knowledge resources)**, overall there appeared to not be a dramatic (completely debilitating) deficit in terms of available resources. However, some needs were expressed; the most urgent being resources for the RTM and funding for local projects; but also several actors would benefit from more personnel and finances. Lack of PPRNs was also communicated as problematic. Some good examples were found of interoperability of resources in, for example, software used by DDT and other officials and positions created for deciphering technical information, but also some negative examples with critiques that the PLU is sometimes not specific enough and there is a need for better management of sharing equipment across communes during an event. Several good examples of inventories exist, while some issues arose with the affordability of information and studies, especially for small communes. Limited evidence was found for back-up assets outside of insurance at the individual level, reimbursement mechanisms for communes through the state, and contributions from the central government in case that a state of disaster is declared.

Table 11.10: Resources category and indicator traffic light results

Indicator	Traffic Light Output (G/Y/R)	Evidence Base
<p>(1) There are adequately available resources including: hazard, risk, vulnerability knowledge; transportation resources; emergency communication resources; personnel; equipment; finances; and time to enable capacity to fulfil tasks for the local level and above.</p>	<p>Green: examples exist of relatively rich informational resources (e.g. RTM, DDT), good example with interns contributing to different local institutions, improved informational availability for environmental assessment, PCS and SDACR provides good informational resources for emergency, local information can be used to replace lack of expertise at local level</p> <p>Yellow: generally adequate resources for most aspects of risk management and assessment processes (for administrative tasks, planning, and emergency management); however, exceptions include especially lack of personnel and finance for RTM, also DDT, lack of finance for local level projects, some examples from other actors having enough information but desiring more staff (SDIS Barcelonnette, Conseil Général, Syndicat), some examples of enough staff but need for finances (Civil Protection)</p> <p>Red: lack of some informational resources like a PPRN can cause difficulties</p>	<p>Transcript F-10 Deputy Departmental Director (DDT 05), F-15&15a Superior Technician (RTM), F-17 Former President of the Sabença Association & former First Deputy of Barcelonnette Municipality, F-21 Consultant (Environmental Studies and Guidance), F-22 Head of Group & Head of Center Departmental Fire and Rescue Service (SDIS 04), F-3 Engineer for Syndicate (Ubaye flood protection), F-8 Barcelonnette Municipality First Deputy</p> <p>Transcript F-11 Director (SDIS Barcelonnette), F-13 Deputy for Roads (General Council of Alpes-de-Haute-Provence), F-18 Leader of Environmental Assessment Plans and Programs Division, (DREAL), F-22 Head of Group & Head of Center Departmental Fire and Rescue Service (SDIS 04), F-3 Engineer for Syndicate (Ubaye flood protection)</p> <p>Transcript F-10 Deputy Departmental Director (DDT 05), F-12 Mayor of Jausiers, F-15&15a Superior Technician (RTM), F-18 Leader of Environmental Assessment Plans and Programs Division, (DREAL), F-19 Former President of Civil Protection for Alpes-de-Haute-Provence, F-1 Geologist (BGRM), F-26 Private Planning Firm, F-2 Director (RTM), F-3 Engineer for Syndicate (Ubaye flood protection), F-9 Private Planning Firm</p>

Table 11.10: (continued)

Indicator	Traffic Light Output (G/Y/R)	Evidence Base
<p>(2) Resources such as equipment, materials, and information are compatible, interoperable and exchanged.</p>	<p>Green: good example found in the software used by the DDT, Prefect, and fire department, information used in environmental assessments in compatible format, good example of planning bureau employing engineering students to decipher technical information</p> <p>Red: critique PLU is sometimes not specific enough, need for better management of use of machines for cleaning on an intercommunal level (bad example of 2008 flood event), some cases information received by planning bureaus not specific enough</p>	<p>Transcript F-10 Deputy Departmental Director (DDT 05), F-21 Consultant (Environmental Studies and Guidance), F-7 Private Planning Firm</p> <p>Transcript F-26 Private Planning Firm, F-7 Private Planning Firm, F-8 Barcelonnette Municipality First Deputy, F-9 Private Planning Firm</p>
<p>(3) An inventory or platform for information exists including information about past events, data sources, best practices and lessons learned in order to assist in the exchange of information between stakeholders.</p>	<p>Green: several good examples exist including RTM online database (information from past events), the BRGM risk platform, the professional users platform from CRIGE PACA, and local level inventories of new and old inhabitants and safe locations</p>	<p>Transcript F-12 Mayor of Jausiers, F-15&15a Superior Technician (RTM), F-17 Former President of the Sabença Association & former First Deputy of Barcelonnette Municipality, F-1 Geologist (BGRM), F-2 Director (RTM)</p>
<p>(4) Resources such as information are affordable.</p>	<p>Yellow: funds given from région to communes to enable them to have what they are required to provide themselves</p> <p>Red: in some cases affects access to information because not all information is free, general comment that there is less money for everything (not only risk), PPRNs are too expensive for small communes (this goes similarly for some studies), communes usually do not have enough funds to pay for protection works</p>	<p>Transcript F-24 Head of Operations, Service for Major Natural Risks, Direction for Development and Housing, Provence-Alpes-Côte d'Azur Region</p> <p>Transcript F-20 Mayor of Faucon de Barcelonnette, F-26 Private Planning Firm, F-3 Engineer for Syndicate (Ubaye flood protection), F-8 Barcelonnette Municipality First Deputy, F-9 Private Planning Firm</p>

Table 11.10: (continued)

Indicator	Traffic Light Output (G/Y/R)	Evidence Base
(5) Resources such as information are affordable.	Yellow: limited evidence but some example of arranged assets if state of disaster declared, individual resources through insurance, reimbursement to communes for protection of departmental roads	Transcript F-20 Mayor of Faucon de Barcelonnette, F-12 Mayor of Jausiers, F-8 Barcelonnette Municipality First Deputy

Summary for Resources:

1. There are generally adequate resources for most aspects of risk management and assessment processes (for administrative tasks, planning, and emergency management); however, there are also some exceptions including lack of personnel and funds for the key actor, the RTM. There is also an issue at the local level in terms of finding adequate funding for mitigation projects along the Ubaye River.

Some examples in planning and territorial management include:

- the DDT has nearly complete knowledge with good resolution including maps of ten different types of phenomena and can acquire precise knowledge needed from private consulting offices
- the RTM has over 100 years of information about all events in the valley and, in case information does not exist, they can (and do) go into the field; however, the RTM does not have enough money or personnel (only two people cover the entire Ubaye Valley) to do what needs to be done
- although rich in information, both the RTM and the DDT lack personnel and finances and this lack affects everyone else in the chain of command who rely on them
- the absence of a PPRN (as an informational resource including also elements at risk) can produce problems because local authorities must rely on a combination of documents (some of which are studies that must be funded and created); the process is not as straight forward, and requires many discussions with state authorities
- not all communes have a PPRN and the lack thereof can provide difficulties for creation of a PLU

Additionally, some examples in emergency management are as follows:

- all actions during crisis time from the RTM (e.g. advice given) are no longer financed; and, though they do not want to do work that is not paid, they know no one else is going to do this work

- the local SDIS in Barcelonnette would like to have more personnel, although they do have adequate equipment and informational resources, which they also receive through collaboration and sharing of resources with the RTM (informational) and the gendarme (equipment) and rely on the PRV (Plan de Regroupement de Victim) to provide evacuation points in case of emergency
- the PCS provides informational resources including where the resources are for responding to an event in which the dikes are broken
- the SDIS 04 has a number of adequate resources, especially equipment but also including information in the PCS and the SDACR (for operational response and resource organization) and also information they get from local people; however, they would like to have a map and model for all the elements at risk to better plan for evacuation and for improved estimation of fire risk
- the Civil Protection does not have many financial resources and would like to be able to receive financial resources from the state to purchase equipment (they currently do this themselves)
- the BRGM have only 4-5 people in all of France monitoring and providing alerts for evacuation to mayors when needed; however, they rely on the RTM in the case study area to manage things as the RTM are closer and are more able to intervene
- for emergency communication, there is discussion (at the time of the interviews) as to use an SMS alert system through the telecommunications company “Orange” for a means of communication between emergency managers (including the crisis management center in Séolane Barcelonnette and the Sub-Prefect)

Within primarily administrative functions, examples included:

- at the local level, for some communes like Jausiers, more financial resources are needed to continue efforts to raise the embankment and build the dike that supports this
- for work like providing necessary diagnostics for dams, the communes especially in the Ubaye are very small; and even the largest (Barcelonnette) has very little competences for this
- the Conseil Général would like to have more personnel in the winter especially for the clearing of snow off the roads
- local knowledge of the territory (e.g. from the mayor and the people of the commune) can replace lack of expertise in during crisis because people are familiar with where the problems are

- at the level and organization of the Syndicat, some resources would be helpful including more personnel, rain gauges, and greater access to hydro-meteorological data as well as access to funding for local projects
- intern positions at the local level (including the RTM, the prefecture, and the municipality) have provided additional informational and organizational resources such as the combination of computer generated map layers for hazard, sensitive population, cleaning resources, etc.
- the municipal offices have adequate information from multiple sources including information they get through their relationship with the RTM and the population

Other examples outside of the above categories include that informational resources are adequate for consulting firms to complete studies (they can get information from other agencies, both state and private although the state does not always have enough resources to assist these firms. Another example is an improvement in information and communicative means for exchanging information for impact assessments (now online and faster).

2. The ability to understand and have a common standard of information and the format in which it is provided influences the exchange and interoperability of resources. For example, a critique was given that the PLU is not precise enough and that there are some cases in which the hazard information is either too general or is (very rarely) not correct. This holds similarly to a statement that in some cases information received by planning bureaus is not specific enough. Another example is found in the software used by the DDT that contains digital information about individual buildings and is also available to the Prefect and the fire department. Most information used in environmental assessments were stated as in a form that is possible to use (unless it does not exist and must be extracted from the field); and that furthermore, information that is accessible from the different departments is on an exportable level. Another example was given in a private planning bureau in which some technical information is deciphered in-house via an engineering student who interprets data from the consulting offices to be used in the planning bureau.

Examples were also given in terms of the sharing of equipment highlighting issues from the 2008 event. This identified a need for better management of use of machines for cleaning on an intercommunal level.¹³

3. Good examples of inventories shared amongst different actors (as well as the public) include:

¹³ During the event in 2008, there were issues with the sharing of machines and equipment for cleaning. For example, if someone was traveling to another commune with a machine, they would be stopped and required by the mayor of that commune to help there (the mayor's commune) first.

- the online database from the RTM with information about measurements, observations, and past events (spanning the last 100 years)
- a platform for professional users with information from the CRIGE PACA (The Regional Center for Geographic Information in Provence-Alpes-Côte d'Azur Region) including information on risk, land cover, and also regarding natural zones, water law, remote sensing images, and GIS data
- the risk platform of the BRGM
- at the local level, an inventory of both new and old members of the population as well as a list of safe places to put people

4. Affordability in some cases affects access to information because not all information, such as some meteorological data, is free (one must pay to access this). There is also a general comment that there is less money for everything, not just the risk. The région gives funds to the communes to enable them to create what they should be creating anyway. For example, they have helped fund communities in order for them to make a DICRIM. Some communes are too small to provide funding for this themselves. Very few municipalities have a PPRN in large part because they are very expensive (can be around 250,000 euro). The federal state subsidizes these costs by 80%, but municipalities may still have to pay in the direction of 50,000 euro, which is very costly or unaffordable for small municipalities. To receive financial resources from the state for protection works, it is important to have a PPRN. For example, with a PPRN, if there was a pre-existing building and a PPRN shows that this already built structure is in a risky area; then it is much more possible to get money from the state. It is also not possible to pay for all of the prevention works that would work in the PPRN, even if they have been identified as there are not sufficient funds to implement everything. Not only in the case of the PPRN; but also for some other studies, these can be very expensive, especially for small communes. One example was given where a study that cost the state 10,000 euro for a commune of 165 inhabitants enabled them to say that an area was too dangerous to build.

5. Although supported by limited evidence, one example of set-aside assets in the case that a state of disaster is declared by the central government. In this instance, the state pays for 100% of all constructed works. In the case of smaller events, individuals must reply on their insurance for paying for damages. In the case that a commune must pay for equipment to protect the departmental road, such as in the 2008 flood event, they can be reimbursed from the department afterward.

Coordination (FR)

For Coordination, defined as: **Formal (legally required) tasks and interactions between multiple stakeholders (including the public) within different sectors and**

levels run smoothly and are positively perceived, “good” examples were found in evidence for harmonization efforts and common procedures. Positive perceptions were also provided in general descriptions of coordinated tasks amongst same horizontal level stakeholders and different vertical level stakeholders. Some issues were revealed, including “the problem of proximity” (although some efforts are made to combat this issue) and in issues with sharing equipment amongst communes, as well as inadequate resources to complete mandatory tasks at the commune level. Many communicative links were found within legally required tasks and interactions, with a good example of external planning firms acting as a neutral agent in presenting project proposals to the population.

Table 11.11: Coordination category and indicator traffic light results

Indicator	Traffic Light Output (G/Y/R)	Evidence Base
(1) Coordination is perceived as effective for managing equipment, training, procedures, planning, emergency care and support, and outside assistance.	<p>Green: generally good perception for required tasks amongst wide variety of authorities</p> <p>Yellow: not stated as problem but desire for greater coordination between some régional services to have closer coordination with the fire department and civil protection work, some disappointment that the RTM is now forbidden from being the official consulting firm for the creation of the PPRN</p> <p>Red: some specific issues with sharing and distribution of equipment amongst communes (especially during response and recovery), problem that communes do not have enough personnel or finances to complete what they are asked to do by the région</p>	<p>Transcript F-10 Deputy Departmental Director (DDT 05), F-20 Mayor of Faucon de Barcelonnette, F-22 Head of Group & Head of Center Departmental Fire and Rescue Service (SDIS 04), F-7 Private Planning Firm</p> <p>Transcript F-23 Head of Urbanism Service and Head of Service for Environmental Risks (DDT 04), F-24 Head of Operations, Service for Major Natural Risks, Direction for Development and Housing, Provence-Alpes-Côte d’Azur Region</p> <p>Transcript F-3 Engineer for Syndicate (Ubaye flood protection), F-8 Barcelonnette Municipality First Deputy</p>

Table 11.11: (continued)

Indicator	Traffic Light Output (G/Y/R)	Evidence Base
<p>(2) Coordination occurs among stakeholders at all levels through a bottom-up approach, starting with the needs of the local up to the higher levels.</p>	<p>Yellow: limited terms of office for prefecture to avoid proximity problem, efforts to work at more intercommunal scale with Syndicat to also relieve pressures on prefecture as well as local level (though some local resistance), structures of coordination and emergency communication and for structural mitigation projects initiated through bottom-up communication structures</p> <p>Red: “the problem of proximity” as a problem for the management of the territory from the bottom up (bias and influence imposed on mayor by proximity or closeness to inhabitants of small municipalities and communes)</p>	<p>Transcript F-11 Director (SDIS Barcelonnette), F-22 Head of Group & Head of Center Departmental Fire and Rescue Service (SDIS 04), F-18 Leader of Environmental Assessment Plans and Programs Division, (DREAL), F-24 Head of Operations, Service for Major Natural Risks, Direction for Development and Housing, Provence-Alpes-Côte d’Azur Region, F-3 Engineer for Syndicate (Ubaye flood protection), F-7 Private Planning Firm</p> <p>Transcript F-18 Leader of Environmental Assessment Plans and Programs Division, (DREAL)</p>

Table 11.11: (continued)

Indicator	Traffic Light Output (G/Y/R)	Evidence Base
<p>(3) A communicative link established between different stakeholders for transferring of information, linking emergency and planning authorities, linking different decision-makers, linking civil protection and environmental services, and allowing for exchange of best practices.</p>	<p>Green: positive examples of external consulting firms acting as neutral informant to population on proposed projects</p> <p>Yellow: a substantial amount of evidence through examples of communicative links were found across a wide range of stakeholders; however, few stated as particular good practice or especially positive example</p> <p>Red: some difficulties expressed in working with and creating dossier for water authorities in case of proposal for bridge construction project</p>	<p>Transcript F-9 Private Planning Firm, F-7 Private Planning Firm Transcript F-10 Deputy Departmental Director (DDT 05), F-11 Director (SDIS Barcelonnette), F-13 Deputy for Roads (General Council of Alpes-de-Haute-Provence), F-1 Geologist (BGRM), F-21 Consultant (Environmental Studies and Guidance), F-22 Head of Group & Head of Center Departmental Fire and Rescue Service (SDIS 04), F-23 Urbanism Service and Head of Service for Environmental Risks (DDT 04), F-24 Head of Operations, Service for Major Natural Risks, Direction for Development and Housing, Provence-Alpes-Côte d'Azur Region, F-25 Former Head of Natural Risks Projects, Grontmij Environment & Infrastructures (private planning firm), F-2 Director (RTM), F-7 Private Planning Firm, F-8 Barcelonnette Municipality First Deputy Transcript F-13 Deputy for Roads (General Council of Alpes-de-Haute-Provence)</p>
<p>(4) There is perceived to be a good level of coordination within horizontal and between different vertical levels as well as across sectors.</p>	<p>Green: different vertical levels, there appears to be (in general) a good level of coordination (stated as “good”), also for same horizontal level (again in general and for legally required tasks), between different sectors, good example of RTM</p> <p>Yellow: CCVU and the Syndicat examples of improvement of intercommunal coordination efforts</p>	<p>Transcript F-12 Mayor of Jausiers, F-13 Deputy for Roads (General Council of Alpes-de-Haute-Provence), F-15&15a Superior Technician (RTM), F-20 Mayor of Faucon de Barcelonnette Transcript F-20 Mayor of Faucon de Barcelonnette</p>

Table 11.11: (continued)

Indicator	Traffic Light Output (G/Y/R)	Evidence Base
(5) Coordinated efforts support a harmonized, holistic approach to DRR using common measures, response language, standards and protocols.	Green: good example with command center at Séolane Barcelonnette (new development for more holistic emergency response operations especially at local level), good example with mandatory PADD (planning) stated as improvement, and PPRN providing common basis of information with which to coordinate planning actions especially for risk, Syndicat also stated good in establishing global knowledge for the Ubaye, informational standards on which to base flood risk assessment with 100 year flood	Transcript F-11 Director (SDIS Barcelonnette), F-12 Mayor of Jausiers, F-20 Mayor of Faucon de Barcelonnette, F-6 Head of Local Development (Mercantour National Park), F-8 Barcelonnette Municipality First Deputy, F-26 Private Planning Firm, F-13 Deputy for Roads (General Council of Alpes-de-Haute-Provence), F-12 Mayor of Jausiers

Summary for Coordination:

1. Coordination, in terms of the functioning of required actions including for emergency, planning, as well as administrative tasks during crisis and in peace time is generally positively perceived and stated to work well from a variety of key informants. This includes examples of coordination between the mayors of some municipalities and the RTM and the local crisis management team, general management for emergency response as well as prevention efforts especially amongst the many different services coordinated by the Prefect, and coordination between consulting firms providing neutral communicative inputs for projects presented to the public on behalf of the local administrative authorities.

However, there are a few exceptions including:

- perception that it is a shame that the RTM is now forbidden from being the official consulting firm for the creation of the PPRN¹⁴
- desire from one of the régional services to have closer coordination with the fire department and civil protection work
- regularly occurring cases in which communes do not have enough personnel or finances to complete what they are asked to do by the région, although the région and the département try to provide financial support (this is why a new position at the Syndicat was created)

¹⁴ This is because they are a public service (from the ONF) and should not create competition for the private consulting services.

- as stated in the Resources category, there are problems with sharing and distribution of equipment (particularly technical cleaning equipment) amongst communes especially during response and relief efforts

2. There appears to be what the research terms as “the problem of proximity” as a problem for the management of the territory from the bottom up. This is based on evidence of statements communicating that the mayors in these many small communes are very close to the people and that this sometimes creates a problem. They know the territory, and they know the people. However, this makes it very difficult for them to make decisions like making areas non-constructible. In response, there is now a move to change the level at which planning takes place (e.g. management of the territory, roads, etc.) to the intercommunal level. For a similar purpose, the officials at the prefecture stay in their position for a maximum of three years to avoid too much influence from the very local level.

There is a reiterated general desire to have more intercommunal scale coordination that helps multiple vertical levels. In the instance of the “higher” (or immediately above local) level, there are already many places that must be managed within the mountain space by the prefecture, which is in part why the position at the Syndicat was created (i.e. to help also relieve some pressure). Although there was initially resistance from the communes at having more intercommunal level management (they want to retain their identity and power), there are still benefits seen in intercommunal efforts like the PLUi and the ScOT (Schéma de Cohérence Territoriales).

Although not stated as positive or negative, structures of coordination and communication through different vertical levels (e.g. emergency communication and for structural mitigation projects) are initiated through the bottom-up with resources, especially information then organized and distributed for the needs of the local level.

3. Several examples were given as evidence of a communicative link established between different stakeholders for transferring of information, including:

- the DDT gets information from the local authorities about measurements from the field and expertise about the land and also works with the crisis team at the prefecture level (the PC) as well as special consulting firms and also consult the RTM (for the PPRN) and the SDIS (for building permits for public buildings)
- there is a link between emergency management, the SDIS (local) and SDIS 04, with the construction of public buildings (e.g. supermarkets, theatres, hospitals), urban subdivision units or “lotissement”, and also for private buildings that people rent out (i.e. for disability access) as these must be checked with the SDIS départemental level fire department

- this link extends further between SDIS and urban planning (also with private planning firms) in that the SDIS consults the Plan d'Urbanisme (land use plan) and are themselves required to be consulted in the case of construction of a dam or dike¹⁵, advice for roads (to fit an ambulance) and accessibility to public buildings, and for the PPRN and PLU with respect to forest fires
- in working directly with the mayor, the Prefet, the RTM, and the Gendarmerie, the Conseil Général are required to be consulted by the mayor for the PLU for their advice in building a road and when they construct bridges, and have to work with the water authorities (sometimes with difficulty) and receive information from the RTM and the water authorities as to the height of the water and the level at which the bridge should be built (e.g. in accordance with a 100 year return period)
- the BRGM provides technical advice to the departemental level (e.g. Conseil Général) and works closely with these actors for different types of risk analysis
- environmental assessment firms take and integrate all information they collect from, for example, different offices (including for technical advice) they have contacted and provide this in a report to urban planners at the local level
- DREAL gives their advice in the form of a technical opinion on the PPI (Le Plan Particulier d'Intervention) and provides a report to the prefecture
- the région has a communicative link to help communes and intercommunal Syndicats especially in managing and building mitigation measures, and works with state and scientific partners to conduct research and build knowledge
- private planning firms, for example in the creation of a PPRN, communicate with and assemble all evidence from authorities (including local, Prefet, and DDT) and other firms conducting studies (also RTM and sometimes DREAL), and present studies to the mayor, and then (depending on request) to the public acting as a neutral entity (helpful in relieving pressure from mayors)
- the RTM is linked to a wide variety of actors through their involvement in crisis management, advice for construction permitting (although they can no longer legally be the consulting firm for creating assessments for the PPRN), and finding funding and creating dossiers for mitigation
- within the local administrative authorities each deputy within the municipality has a particular competency domain and liaises with responsible external authorities; for example the first deputy (first adjoint) is in charge of urbanism (in case of crisis works with prefecture and sub-prefecture) and another deputy is in charge of the environment and energy (liaises with RTM)

¹⁵ They give their advice with respect to the safety of the population and what could happen in the case that the dams or dike were to break.

- for the prefecture level, there is a communicative link with exchange of information between the prefecture and the SDIS command center as this sending of information is one of the missions of the SDIS
4. Between different vertical levels, there appears to be (in general) a good level of coordination. Examples and general statements are given of this between administrative actors at different levels, emergency and territorial management (both in times of crisis and in peace time). The same has been voiced for the perceived general standing of coordination between actors in the same horizontal levels (appears to be no immediate issues in terms of legally required tasks conducted together). However, a few comments can be made with respect to coordination of efforts including the creation of informal organizational structures to improve both cooperation and coordination via the CCVU and the Syndicat. With regard to the latter, and with the help of the state, they are able to finance a technician for two years to work on who is charged with collecting all the information needed for where to put protections in the valley. For across sectors, a good example is found in coordination between local administrative authorities and the RTM.
5. Some examples were provided in terms of informational standards on which to base flood risk assessment, such as the 100 year return period (stated by at least one municipal informant as good for protecting the population). Another example is the new command center at Séolane Barcelonnette. This includes the Post de Command Opérationnelle (PCO) on the last floor, which is for managing emergency with experts from the gendarme, fire department, and the RTM among others, and is put into effect in the case of a large event or "big danger". Due to the fact that in case of flood, the prefecture, the fire department, and the police station would all be under water, this is an important way to bring all these actors together and harmonize coordinated efforts. Other examples exist in planning and in efforts to strengthen intercommunal coordination.

For planning, one example is the mandatory PADD, which can be at different levels (or several together), and defines a 10-year common understanding of goals for the municipality (seen as an improvement from past procedures and planning options). Another example is found in the common standard of the PPRN and all urban planning documents that must follow in accordance with this (common basis of information with which to coordinate planning actions and especially for what is done about risks and organizing intervention). In referring to the move toward more intercommunal efforts, for example with the Syndicat, it was stated that it is better to have one body guide the whole process. This is particularly relevant considering that in 2008, the event was very quick and communes did what they could for themselves but did not work collectively. The goal of the Syndicat is to improve this situation by also having a global knowledge of rivers, the area along the

Ubaye, and the needs of each of the communes.

Cooperation (FR)

For Cooperation, defined as: **Informal (not legally required) tasks and interactions between multiple stakeholders (including the public) within different sectors and levels run smoothly and are positively perceived**, significant issues included lack of cooperation and problems at the local political level especially in terms of funding protection works such as dikes and reinforcing embankments along the valley. Efforts to increase intercommunal planning and organization have and are attempting to remedy this. Overall, there are positive examples including regular meetings among a variety of actors at département level and generally well perceived cooperation for crisis related tasks. Some evidence was found of a positively perceived attitude of authorities toward public interaction. This is held similarly for evidence of flexibility pursued by the municipal offices in favor of the needs of the public for managing parcels and also served as a positive example. There is also potential to increase informal interaction with the public through the mission of the Syndicat, which could help alleviate a currently perceived deficit. There appeared to be a very wide range of informal interactions amongst different actors and especially across sectors. Some suggestions were given for problems identified including a need for informational forums amongst all river stakeholders and a means through which civil protection's advice can contribute to rescue plans. A suggestion was also made that having more training for the public would be a good idea but must also be cautious in content to not scare the population and especially tourists. Good examples were also found for informal structures of information exchanges including the many, regular informal meetings with a variety of different actors including all levels up to the région on the topic of risk, the recently developed crisis management center (and structure) at Séolane Barcelonnette, as well as the structure of cooperation and information transfer established through the Syndicat with local and higher level authorities.

Table 11.12: Cooperation category and indicator traffic light results

Indicator	Traffic Light Output (G/Y/R)	Evidence Base
<p>(1) The informal tasks and interactions are positively perceived within and between all levels.</p>	<p>Green: Overall, cooperation for crisis and related matters is positively perceived, good example of regular meetings at département level</p> <p>Yellow: some critique that sometimes too much organization of risk management (although generally well organized), cooperation on the local political level has some problems (esp. with planning and funding protection works in the valley), intercommunal efforts are made to try to remedy these problems (e.g. via the Syndicat)</p> <p>Red: some conflicts in cooperation between civil protection and Red Cross</p>	<p>Transcript F-11 Director (SDIS Barcelonnette), F-17 Former President of the Sabença Association & former First Deputy of Barcelonnette Municipality, F-19 Former President of Civil Protection for Alpes-de-Haute-Provence, F-20 Mayor of Faucon de Barcelonnette, F-8 Barcelonnette Municipality First Deputy, F-9 Private Planning Firm</p> <p>Transcript F-12 Mayor of Jausiers, F-15&15a Superior Technician (RTM), F-24 Head of Operations, Service for Major Natural Risks, Direction for Development and Housing, Provence-Alpes-Côte d’Azur Region, F-26 Private Planning Firm, F-3 Engineer for Syndicate (Ubaye flood protection), F-8 Barcelonnette Municipality First Deputy</p> <p>Transcript F-19 Former President of Civil Protection for Alpes-de-Haute-Provence</p>
<p>(2) Informal tasks and interactions are positively perceived within the local level and especially with interactions involving the public.</p>	<p>Green: Some evidence indicated from a community leader that the authorities and administration have a positive attitude with regard to public interaction, some evidence of positive interaction through finding flexibility in favor of public needs in parcel negotiations</p> <p>Yellow: currently limited interaction (aside from alerts and reporting) with the public and authorities outside the municipal office; however, interaction with the public might increase with mission of the Syndicat (might also help improve the perception that there should be more regular meetings at the local level with local stakeholders)</p>	<p>Transcript F-5 Barcelonnette Municipality Deputy for Culture, F-8 Barcelonnette Municipality First Deputy</p> <p>Transcript F-11 Director (SDIS Barcelonnette), F-13 Deputy for Roads (General Council of Alpes-de-Haute-Provence), F-12 Mayor of Jausiers, F-13 Deputy for Roads (General Council of Alpes-de-Haute-Provence), F-3 Engineer for Syndicate (Ubaye flood protection), F-8 Barcelonnette Municipality First Deputy</p>

Table 11.12: (continued)

Indicator	Traffic Light Output (G/Y/R)	Evidence Base
<p>(3) Informal interactions exist between those who are practitioners, policy makers, and scientific researchers as well as across sectors, especially between planners and emergency management authorities.</p>	<p>Green: there appeared to be a wide variety of interactions between different types of actors and especially across sections including emergency management and planning with good examples including informal advice from the RTM, positive relationships between emergency management and prefectural planning</p> <p>Yellow: although not stressed as a problem, there is desire a by geological services to have private planning offices be more present in discussions</p>	<p>Transcript F-2 Director (RTM), F-15&15a Superior Technician (RTM), F-10 Deputy Departmental Director (DDT 05), F-17 Former President of the Sabença Association & former First Deputy of Barcelonnette Municipality, F-11 Director (SDIS Barcelonnette), F-19 Former President of Civil Protection for Alpes-de-Haute-Provence, F-21 Consultant (Environmental Studies and Guidance), F-22 Head of Group & Head of Center Departmental Fire and Rescue Service (SDIS 04), F-23 Head of Urbanism Service and Head of Service for Environmental Risks (DDT 04), F-4 Barcelonnette Tourism Office, F-5 Barcelonnette Municipality Deputy for Culture, F-9 Private Planning Firm, F-3 Engineer for Syndicate (Ubaye flood protection)</p> <p>Transcript F-1 Geologist (BGRM)</p>
<p>(4) Non-formal structures exist in terms of exchange of information between vertical levels especially for exchange of best practices.</p>	<p>Green: some good examples given with many, regular informal meetings including also meetings in which emergency actors such as civil protection can be part of, others include the structure of the crisis management center at Séolane Barcelonnette and the connections of the Syndicat to local and higher level authorities</p> <p>Red: suggestions for improvement points included a need for informational forums for all river stakeholders, and a means through which civil protection can contribute advice to rescue plans</p>	<p>Transcript F-19 Former President of Civil Protection for Alpes-de-Haute-Provence, F-1 Geologist (BGRM), F-20 Mayor of Faucon de Barcelonnette</p> <p>Transcript F-19 Former President of Civil Protection for Alpes-de-Haute-Provence, F-3 Engineer for Syndicate (Ubaye flood protection)</p>

Table 11.12: (continued)

Indicator	Traffic Light Output (G/Y/R)	Evidence Base
(5) Informal tasks and interactions are perceived as positive for research, training, education, and volunteer activities. (also from interview transcripts)	Yellow: Although evidence exists to indicate many of these activities, limited information was gathered toward a positive (or negative) perception with one suggestion of more trainings for the public (good idea) but ensure people not afraid, especially tourists	Transcript F-15&15a Superior Technician (RTM) (Examples of existing activities: F-19 Former President of Civil Protection for Alpes-de-Haute-Provence F-24 Head of Operations, Service for Major Natural Risks, Direction for Development and Housing, Provence-Alpes-Côte d’Azur Region)

Summary for Cooperation:

1. In terms of informal relationships and interactions, there appears to be a generally positive perception with the following examples: good relationship between the Gendarme and the firemen and between the firemen (local) and the other authorities; between the civil protection and the firemen (e.g. civil protection provides logistic help, as with food, and places to rest); between civil protection and higher administrative levels (although, as previously mentioned some conflicts in cooperation between civil protection and Red Cross); between municipal authorities and the RTM, as well as between consulting firms and the RTM; and generally good relationships amongst local authorities and communes especially through the CCVU (reiterated as the scale at which management should happen). However, there are some exceptions (see next paragraph). Other examples come from positively perceived monthly meetings (most often at the département level) of all authorities involved in emergency management, management of the territory, and all administration.

However, there are also some critiques including that although risk management is well organized, sometimes there is maybe too much organization. At the same time, there are also critiques as to how well communes work together informally. The main source of disagreement among communes is stated as money for protection works and the maintaining of these works, because they are not all effected equally by natural hazards.¹⁶ Evidence indicates that communes tend to ask for projects individually but not together (ask for

¹⁶ For example, it was stated that Barcelonnette probably needs the most money because they need to maintain dikes and other structures. However, Saint Pons and the other communes are less affected and, therefore, less inclined to contribute to this. Further stated is that upstream from Barcelonnette the communes want to work together, but from Barcelonnette and downstream they all want to do things individually.

separate projects and there is no priority management) and that cooperation is also hindered by smaller communes' desire to protect their identity and importance against the bigger towns upstream (e.g. Barcelonnette as the bigger town). On the planning side, perceptions were also communicated that unless there is a political structure at the intercommunal level, it is not even worth talking about trying to make any intercommunal planning efforts. Occasionally, cooperation depends also on whether communes support different political parties. Overall, cooperation on the local political level has some problems, but for crisis and concrete matters everything is fine. With higher levels of authority, there is a good relationship if they (local level) are made a priority, but when they are not a priority for the département, for example, then the communication is not so positively perceived.

Efforts to address some of the above issues include: monetary incentives from the région given to the local level for creating a global PCS, the creation and assistance of the Syndicat for the creation of the PCS and current efforts toward an intercommunal vision (also toward agreement on pooling money for protection works and especially repairs to these),¹⁷ and current efforts to creating a SCoT (Schéma de Cohérence Territoriale or territorial coherence plan) at the intercommunal level.

2. Evidence does not indicate much in terms of examples of interactions with the public outside of the local administrative authorities. Most of this is comprised of interactions from the mayor's office to the public (much more often than with the Sub-Prefect), or from another authority through the mayor's office to the public. The latter is the case, for example, with the Conseil Général who informs the mayor's office when there are road closures, in which there is sometimes tension and people complain (though this is stated as not being a problem). However, interaction with the public may be increased as this is one of the missions and is planned with the new position in the Syndicat. This might also help improve the perception that there should be more regular meetings at the local level with local stakeholders, which is stated as not common although sometimes occurring for a particular problem. Interactions with the public for emergency management focused actors (e.g. Gendarmerie, local SDIS) is often only through alerts given during an event and when members of the public call in to report an issue (e.g. rock fall along the road). At the municipal level, interactions also include attempts to negotiate risk designations for particular parcels to help meet the needs of the owners.¹⁸ In the case presented, local authorities

¹⁷ They have a syndicate mixed (with the 14 communes and the Conseil Général that must work together) to try to improve working relationships between the different communes and to pool money, as costs for protection works are too high for individual communes (for example, estimations are 650,000 EUR for raising the embankments, 10 million EUR for maintenance just for Barcelonnette).

¹⁸ For example, there was a property where the owner died, and the parcel was subdivided into different parts for his daughters. However, one of the parcels was entirely red and, therefore, the authorities tried

were glad they were able to meet the needs of the public, implying a positively perceived interaction. Some evidence indicated from a community leader that the authorities and administration have a positive attitude with regard to public interaction. It is also stated that people are well connected in terms of communication with each other within Barcelonnette.

3. Many examples of informal interactions across sectors were found including the following:

- many informal interactions between the RTM and various actors including the mayor, the local SDIS and the DDT (directly connected to the Prefect) in which the RTM provides consultation and technical advice often for plans such as the PVR, the PCS, the PLU, construction permits and projects, as well as during emergency situations. This advice is not mandatory but is often agreed upon, relatively well-received, and followed and is paid for by the state at no cost to the communes and prefecture
- evidence indicating positive relationship between DDT, the fire department, and the prefecture in terms of interactions for communication of information
- desire by geological services to have private planning offices be more present in discussions with them and with other authorities together
- for the creation of the PLU there are regularly informal exchanges between the environmental assessment consultants and other specialists. The former also collects this information from the specialists and provides this to planners
- consultants for environmental impact assessment can get information from the Ministère de l'Écologie du Développement Durable et de l'Énergie about risk of flood, landslide, rock fall, avalanches, and fire in the south of France
- if asked (though this is not often) the SDIS (both local and SDIS 04) give their advice on the PCS
- the Office of Tourism in Barcelonnette speaks regularly (informally) with public authorities about risk management, particularly because there are areas where the Ubaye can overtop the dikes, and are also in regular contact with the local population and also give advice to the municipality on matters of protecting tourism (a major economic sector)
- there is informal interaction between scientific researchers at Séolane Barcelonnette and the local authorities concerning risk information, enabling also partnerships to help provide information needed for some projects (e.g. real time radar for rainfall)
- civil protection also provides voluntary input when asked by the fire department, communes, the Prefect, and associations of civil protection volunteers

to negotiate to allow her to be able to build a house on part of this subdivided, red parcel. They negotiate these points with the prefecture.

- in the creation of the PLU, many informal meetings and interactions take place with consulting firms, the local population, and with local authorities
- for the creation of the DICRIM, many authorities work together to create this across sectors including the prefecture, the local administration in Barcelonnette, the RTM, and the CCVU among others
- consulting firms, if they believe there is a risk, can also informally discuss and request to do a study with a municipality, although it is not obligatory for the mayor to acquiesce this request
- fire departments can tell the département that they need roads to be a certain width for emergency vehicles, and consulting companies can then adhere to these requirements in projects and assessments

4. Some examples of non-formal structures for exchange of information between vertical levels included:

- the ability of emergency management actors such as civil protection to attend meetings at the prefecture level to be informed of what is going on (civil protection operates at all vertical levels)
- many and regular meetings with all actors between the région and the local level and the département and the state about risks starting from 2012 with BRGM as a connector between these actors (e.g. the Region is concerned with management of the territory, the state is concerned with information for the public for prevention)
- the development of the new crisis management center at Séolane Barcelonnette, which will house a variety of commune and prefecture (among other) authorities in the case of crisis
- the Syndicat was created with state support primarily for bolstering cooperation across the communes but also maintains connection to the state and to other régional authorities (e.g. the water authority)

Additionally, a suggestion was made that there should be informational forums for all river stakeholders including those involved in rafting, fishing, and municipal authorities among others. Another suggestion given was that, although advice given by civil protection is not taken into account, there should be a means through which to make this possible for issues such as rescue plans in the high mountains.

5. Although evidence exists to indicate the existence of these activities, limited information was gathered toward positive perception of training, research, and volunteering. One suggestion was made that having more trainings for the public might be a good idea; but

they do not want to make people afraid, especially the tourists because they might not come back.

Risk Culture (FR)

The category of Risk Culture with its definition as follows: **Strategies work toward a “culture of safety” translating to outcomes including a high level of risk awareness, a focus on prevention, consideration of the needs and priorities of the local level, and encouragement and empowerment of local level self-initiated actions to enhance capacity for DRR**, had by far the most substantial evidence base. For self-initiated actions, insurance was seen as a good example; however, the availability of information does not guarantee people will take this or other such actions (which also depends on the type of hazard), and there is uncertainty with where to find information for what individuals can do to protect themselves and their homes. Some good examples were found in support of awareness with also a strong connection between awareness and the location in which people live; however, there were very mixed views as to whether the population is indeed aware. This depended upon the type of key informant. A key problem appeared to be lack of awareness for newcomers and for tourists as well as some evidence suggesting more public meetings and further education are needed. There were also mixed perceptions on whether strategies focus on prevention, with views ranging widely amongst different informant types (though not all are held in contrast). This ranged from a general perception that there are substantial efforts made for prevention, to the need for improvement and issues highlighted for the reactive nature of actions taken by authorities. Other issues revealed that one must have courage to pursue preventative actions that are not readily visible, and that there are problems (as well as some benefits) to “the big umbrella” also known as the “principle of precaution”.

For integrating local needs, some good examples were found in consultations between consulting companies and the public. Many interests that are and must be considered were provided and further revealed that risks and hazards are generally not included within the top priorities (but rather in the middle or bottom of the list). Given the especially financial limitations of the small rural communes, efforts for integrating these needs, as well as within risk management, are made via organization of activities at the intercommunal level. The issue of “the problem of proximity” was also present, highlighting first an attention to integrating local needs but with potentially negative consequences. This is also assisted by enhancing intercommunal level territorial management. For maintaining livelihoods there was limited evidence but some to indicate efforts to create jobs and attract industry, as well as indication of conflicts between favoring urbanized versus rural areas and in having people understand that the Syndicat will not make efforts to protect crops (for example in the case of an event).

Table 11.13: Risk Culture category and indicator traffic light results

Indicator	Traffic Light Output (G/Y/R)	Evidence Base
<p>(1) The local level and especially the population is empowered and encouraged to be informed and to take self-initiated actions (e.g. insurance).</p>	<p>Green: people tend to have the natural hazard insurance issued by the state (is part of their normal home owners insurance policy)</p> <p>Yellow: availability of information does not equate to people taking self-initiated actions and changing behavior although there is perhaps more interest now in people getting involved in becoming more informed, uncertainty as to what kind of actions can be taken and where to find information about this outside of scientific forums and calling the mayor, some mixed views on whether more of the information is necessary, more information desired in the case of potential rapid onset events</p> <p>Red: whether people take self-preventative actions can depend upon hazard, for fire hazard this (e.g. insurance and incentives) is well-developed but not for flood hazard</p>	<p>Transcript F-5 Barcelonnette Municipality Deputy for Culture</p> <p>Transcript F-16 Curator of Barcelonnette Museum, F-4 Barcelonnette Tourism Office, F-5 Barcelonnette Municipality Deputy for Culture</p> <p>Transcript F-24 Head of Operations, Service for Major Natural Risks, Direction for Development and Housing, Provence-Alpes-Côte d'Azur Region</p>

Table 11.13: (continued)

Indicator	Traffic Light Output (G/Y/R)	Evidence Base
<p>(2) The population is well-informed and has a high level of awareness (e.g. also through role of media). (also from interview transcripts)</p>	<p>Green: good examples of maintaining awareness through trying to keep memory of flood of 1957 alive (e.g. exhibitions); other examples include workshops with children, scientific information from Séolane Barcelonnette, attentiveness to weather information (via Internet, radio, and Météo), and information published and maintained by L'Association Sabença de la Valéia</p> <p>Yellow: level of awareness of the population is significantly connecting to the place in which they live and the fact that they are familiar with the environment in which they live. There are some mixed perceptions regarding this point amongst the key informants (local people who have lived there a long time know the risks), mixed perceptions about disaster memory and awareness depending upon key interviewee (e.g. some local community leaders and authorities feel there is a high or at least adequate awareness, while DDT and RTM generally think improvement is needed), belief that no such thing as zero risk exists communicated and that this understanding is generally needed</p> <p>Red: issue with lack of awareness for tourists and newcomers, need for balance in providing information while not inciting fear, need voiced for more public meetings and expanding education efforts for population as well as local authorities</p>	<p>Transcript F10 Deputy Departmental Director (DDT 05), F-14 President of the Sabença Association, F-4 Barcelonnette Tourism Office, F-5 Barcelonnette Municipality Deputy for Culture, F-9 Private Planning Firm</p> <p>Transcript F-6 Head of Local Development (Mercantour National Park), F-17 Former President of the Sabença Association & former First Deputy of Barcelonnette Municipality, F-23 Head of Urbanism Service and Head of Service for Environmental Risks (DDT 04), F-26 Private Planning Firm, F-3 Engineer for Syndicate (Ubaye flood protection), F-13 Deputy for Roads (General Council of Alpes-de-Haute-Provence), F-16 Curator of Barcelonnette Museum, F-20 Mayor of Faucon de Barcelonnette, F-2 Director (RTM)</p> <p>Transcript F-24 Head of Operations, Service for Major Natural Risks, Direction for Development and Housing, Provence-Alpes-Côte d'Azur Region, F-4 Barcelonnette Tourism Office, F-8 Barcelonnette Municipality First Deputy, F-9 Private Planning Firm, F-14 President of the Sabença Association, F-10 Deputy Departmental Director (DDT 05), F-11 Director (SDIS Barcelonnette), F-15 F-15&15a Superior Technician (RTM), F-16 Curator of Barcelonnette Museum, F-23 Head of Urbanism Service and Head of Service for Environmental Risks (DDT 04), F-3 Engineer for Syndicate (Ubaye flood protection), F-6 Head of Local Development (Mercantour National Park), F-5 Barcelonnette Municipality Deputy for Culture, F-7 Private Planning Firm</p>

Table 11.13: (continued)

Indicator	Traffic Light Output (G/Y/R)	Evidence Base
<p>(3) Strategies employed encourage a focus on prevention and emphasis on ‘pre-disaster activities’ (also from interview transcripts)</p>	<p>Yellow: mixed perceptions on the current focus (or lack thereof) on prevention in current strategies, e.g. range from statements from several authorities that prevention of risks in France in general is good to perception (of some risk assessment and planning informants) that authorities reactive in taking action too quickly and normally only after an event, similar informants stating prevention existing but not well-developed although increasing over last ten years, emergency management informants have perception emergency given more attention than prevention, which partially contrasts with territorial management informants’ perception (latter stated prevention given greater importance), several informants indicate both are needed for success in reducing future crisis Red: issue of need to be courageous to do “invisible” work (i.e. prevention efforts whose output is not readily visible), the problem (and some benefits) of “the big umbrella”, and “principle of precaution (please see summary contents)</p>	<p>Transcript F-9 Private Planning Firm, F-10 Deputy Departmental Director (DDT 05), F-11 Director (SDIS Barcelonnette), F-15&15a Superior Technician (RTM), F-19 Former President of Civil Protection for Alpes-de-Haute-Provence, F-1 Geologist (BGRM), F-20 Mayor of Faucon de Barcelonnette, F-21 Consultant (Environmental Studies and Guidance) F-23 Head of Urbanism Service and Head of Service for Environmental Risks (DDT 04), F-24 Head of Operations, Service for Major Natural Risks, Direction for Development and Housing, Provence-Alpes-Côte d’Azur Region Transcript F-23 Head of Urbanism Service and Head of Service for Environmental Risks (DDT 04), F-6 Head of Local Development (Mercantour National Park), F-17 Former President of the Sabença Association & former First Deputy of Barcelonnette Municipality, F-13 Deputy for Roads (General Council of Alpes-de-Haute-Provence), F-18 Leader of Environmental Assessment Plans and Programs Division, (DREAL), F-26 Private Planning Firm, F-8 Barcelonnette Municipality First Deputy, F-9 Private Planning Firm</p>

Table 11.13: (continued)

Indicator	Traffic Light Output (G/Y/R)	Evidence Base
<p>(4) Strategies pursue solutions that take into consideration the characteristics, needs, and priorities of the local level (especially of high risk areas).</p>	<p>Green: good example of integrating local level needs found in some public consultations led by consulting companies</p> <p>Yellow: a fair number of priorities given that are and must be considered (e.g. landscape and agriculture, tourism, roads, weather, general economy and population increase), risks considered normally not as high priority compared to these (especially family, health, and employment ranked higher), given limitations that go along with the needs of these small rural localities efforts to integrate these needs have been made through the organization of activities at the intercommunal level (e.g. in managing events, ensuring roads clear, planning land use and landscape, maintaining river and coherent understanding of risks in valley), “problem of proximity” also integrates local needs but with potentially negative consequences but organization and territorial planning at intercommunal level seen to help avoid these negative consequences</p>	<p>Transcript F-10 Deputy Departmental Director (DDT 05), F-9 Private Planning Firm Transcript F-15&15a Superior Technician (RTM), F-18 Leader of Environmental Assessment Plans and Programs Division, (DREAL), F-12 Mayor of Jausiers, F-13 Deputy for Roads (General Council of Alpes-de-Haute-Provence), F-17 Former President of the Sabença Association & former First Deputy of Barcelonnette Municipality, F-18 Leader of Environmental Assessment Plans and Programs Division, (DREAL), F-23 Head of Urbanism Service and Head of Service for Environmental Risks (DDT 04), F-22 Head of Group & Head of Center Departmental Fire and Rescue Service (SDIS 04), F-20 Mayor of Faucon de Barcelonnette, F-21 Consultant (Environmental Studies and Guidance), F-24 Head of Operations, Service for Major Natural Risks, Direction for Development and Housing, Provence-Alpes-Côte d’Azur Region, F-25 Former Head of Natural Risks Projects, Grontmij Environment & Infrastructures (private planning firm), F-3 Engineer for Syndicate (Ubaye flood protection), F-4 Barcelonnette Tourism Office, F-5 Barcelonnette Municipality Deputy for Culture, F-6 Head of Local Development (Mercantour National Park), F-7 Private Planning Firm, F-8 Barcelonnette Municipality First Deputy</p>

Table 11.13: (continued)

Indicator	Traffic Light Output (G/Y/R)	Evidence Base
<p>(5) Efforts are taken to protect livelihoods through the provision of information on individual actions that can be taken, as well as community based local level activities (e.g. training, drills, volunteering) to enhance local capacities.</p>	<p>Yellow: general, efforts toward bolstering the economy and creating jobs and attracting industry are also encouraged in future strategy development for the valley and especially in Barcelonnette, livelihoods protected but potential “problem of proximity” in favor of economic over environmental interests</p> <p>Red: conflicts between favoring urbanized versus rural areas, issue with some people not understanding Syndicat will not protect crops</p>	<p>Transcript F-21 Consultant (Environmental Studies and Guidance), F-4 Barcelonnette Tourism Office Transcript F-18 Leader of Environmental Assessment Plans and Programs Division, (DREAL), F-3 Engineer for Syndicate (Ubaye flood protection)</p>

Summary for Risk Culture:

1. The availability of information does not necessarily equate to people taking self-initiated actions and changing their behavior. However, it was also communicated that there is perhaps more interest now in people getting involved and becoming more informed. This is stated as something that is starting to take shape within the culture, but only recently and perhaps due to many accidents that occurred.

There also appears to be some uncertainty with regard to what kind of self-initiated actions can be taken by individuals and where information regarding these kind of actions can be found. Key informants stated that they could attend what is offered by the scientific community and could also contact the mayor, but there is still uncertainty of where to look outside of this and the regular rescue numbers like the 112, and the 118. Other community leaders stated that people tend not to think about what individual actions they can take and that there is not a general need to have more information about these potential actions, such as actions to protect their homes. Still others expressed that if there is a high likelihood something will happen, then for certain it would be good to know what actions can be taken individually. One such key informant also reiterated that he thought there is normally adequate time to evacuate in case of flooding and that this is a less dangerous hazard than earthquake. However, he stated that if he is mistaken and there is actually much less time to react; he would want to know this in order to take specific actions and protect his home. One other point was regarding insurance that is available from the state for hazards but is not mandatory. Most people tend to have this insurance because it is

already included as part of their home owner's insurance; particularly because if there is another person in your home and there is a problem, you can be responsible and liable.

Whether or not people take self-initiated actions to protect their home can depend upon the hazard. It was stated as an example that in the case of fire hazards, people tend to take individual protection measures for their homes. The reason for this is that the insurance is very restrictive; for example, if people do not clear brush and remove trees to a certain distance from their home, they will not be reimbursed for fire damages. This is not the same case with respect to flood hazards.

2. The level of awareness of the population is significantly connecting to the place in which they live, and the fact that they are familiar with the environment in which they live. There are some mixed perceptions regarding this point amongst the key informants; however, there is substantial evidence to indicate at the local level that people are familiar and aware that they are living in a difficult and at times risky mountain environment; but they accept that this is a regular part of life in the mountains and choose to live here. This is connected to another key aspect: disaster memory. It is stated at the local level that events occur every two years, a frequency high enough that there is not adequate time to forget. This is also cited as connected to the mountain environment, in contrast to the plains where events might occur every 50 years. One informant cited the flood of 1957 and stated this is still strong in the memory of the population, especially as the destruction was impressive and that people who were five or ten years old the time are still alive today and can tell you what it looked like (e.g. mud everywhere, boats everywhere, crushed houses). The knowledge of this event and memory is still kept alive through videos, exhibitions in museums, lectures, and through families. It is also a discussion that is brought up each year whenever the Ubye River rises.

In contrast to these local perceptions, some key informants communicated a different perspective. Authorities particularly from the DDT and the RTM generally appeared to hold the perception that the public does not have an adequate knowledge of risks and hazards. Examples of this were given in the context in which a person is pursuing an economic benefit, whether that be developing land or trying to sell their property. It is stated that the disaster memory is short in the case that people have financial incentives such as wanting to sell their land and wanting to expand economic development and encourage industry in the community. Particularly when people want to build and they see that the river is quiet and there is no danger, it becomes difficult to communicate potential risk, especially when no event has occurred in 20 years on their land and given the limited availability of building space in the mountain. This lack of memory is associated also with a lack of understanding for road closures and building prohibitions (people want to build where they

want, and want roads to be open immediately). One informant also connected disaster memory to having a “culture of risk” which was associated with awareness and attention given to risk. The point made is that if people have not seen or experienced an event that they do not have the knowledge and they will not think an event will occur. Further stated was that people are in this case very confident in themselves and in thinking nothing will happen. One community leader stated that perhaps she does not take the risks seriously enough, saying that she was more concerned about earthquake hazards than flood and that in comparison to other disasters that happen around the globe, their (the Ubye’s) hazards are not as significant.

An historical example of disaster memory loss was also given that homes before the 1940s and after the creation of the PPR are usually not affected by events; however, homes that are affected are usually those built in the 1960s and 70s.¹⁹ Currently, people do not think there is a danger because they believe authorities are only permitting construction in places that are safe (and they, consequently, do not have to worry about risk).

Uncertainty was also a key issue with respect to knowledge. In summary, what was communicated by a range of actors is that one cannot eliminate risk completely and that zero risk does not exist. Even if there is a PPRN, there is still always uncertainty. It was stressed that not all stakeholders understand this, and that there is a need for a new “risk culture” with the understanding that it is impossible to have zero risk.

Despite the above there are some examples to indicate efforts in encouraging a well-informed and knowledgeable population and the maintaining of this knowledge. Some examples included workshops with children in understanding risk, scientific information presented at Séolane Barcelonnette, attentiveness to weather information (via Internet, radio, and Météo), and available information that is published and maintained as part of the history of the valley by L’Association Sabença de la Valéia. The lattermost is stated as helping people to not forget and to keep the memory of past events like the 1957 flood alive by using the best knowledge of the past to feed the present and to help improve and to have a vision for the future. Some local municipal authorities believe the population has enough knowledge and information about the risks. Another example is enhanced awareness through public meetings in which consultant companies present projects at the municipality and (as understood by one such company) people start to have a better understanding of why there is no room to build and in the many difficulties in enabling building permissions. Issues were also addressed with the need to expand the above efforts including: the need for more public meetings led by local authorities and general need for

¹⁹ Before the 1940s, there was a stronger memory of events; and after the creation of the PPRN, there are regulations that must be followed and areas in which building is not permitted.

enhancing risk (and especially flood) -related education for both local authorities and the general population, especially for children.

One last specific issue was a lack of knowledge but need for balance to not create fear, particularly in addressing tourists and newcomers. There is a risk in authorities providing too much information and, consequently, frightening the public. They try to balance providing enough information but not scaring the population and especially not the tourists. In the high tourist season the population can expand from an average of 8000 people to around 35,000. Tourists do not have the same knowledge as the local population (especially those born in the Alps and are more familiar with potential risks), and tend to think they can go to any part of the territory. Informing and improving tourists’ knowledge is difficult because there is not adequate time to educate them, there is normally no connection to local knowledge networks (discussions with neighbors and longstanding residents about risks, for example), and generally no interest in this information from the tourists themselves. They are stated (by several informants) as not having the culture of the mountains and not understanding its dangers. Similarly to tourists, new inhabitants (and especially those buying new properties) also do not possess this knowledge; however, over time, this knowledge will expand, especially in connecting to local networks, and connecting to the nature of the mountain. However, this group would benefit from receiving information about potential risks upon their arrival in the community.

3. There are some mixed perceptions on the current focus (or lack thereof) on prevention in current strategies. This ranges from statements that there are substantial and good prevention efforts in France in general to the need for improvement in prevention focus. There is a general perception from a variety of key informants that it is better to prevent than to react but that sometimes what is done by the authorities is very reactive, especially for flooding (for example, when an event occurs sometimes the reaction is to adopt measures too quickly which are not adequate). In terms of development of the law, some authorities state that laws linked to urbanism and planning and risk are created after a terrible event in a “return on experience” kind of a way, making planners more reactive in contrast to civil protection which operates more in a cycle. Informants working in risk research and assessment reiterated that there has been a lot of prevention, but that this is not very well developed. Often prevention efforts increase after an event especially for research in terms of the number of actors and institutions working together and funding, but the efforts tend to reduce and run out after the first one to two years. Prevention efforts have, according to some informants, generally tended to increase over the last ten years. Within the scope of emergency management, some authorities (operating within this scope) believe that more immediate attention is given to emergency response, but that there are improvements toward greater prevention. Others involved in local risk assessment

and territorial management (the RTM, for example) consider that for risk management in general prevention is given greater importance. Both emergency management and management of the territory as a risk prevention instrument are seen by DDT authorities as equally important and that, furthermore, success in both will mean less crisis in the future.

One reiterated issue was that prevention tends to be invisible, and that working in prevention is “secret” or “invisible” work in comparison to efforts made in response and recovery activities. One must be courageous to do “invisible” tasks as the local authority, especially as people tend to care about what they can see and that officials up for election tend to prioritize these more visible actions (e.g. visible measures) than others.

Prevention is also associated with precaution, and in this case has been very strongly communicated by key informants as “the big umbrella” or the “principle of precaution”. There are some benefits and positive perceptions about the big umbrella, but also a far greater number of negative comments with the perception that there is too much precaution taken. Some positive perceptions are as follows:

- it is better to spend money on prevention to avoid spending more money later when you have to react (although there is not enough money to cover all risk zones)
- if there is an uncertainty then there is a presumption of risk and if there is a presumption of risk, it is better to (and one must) apply the precautionary principle and err on the side of greater precaution also and especially in the case of uncertainty with hazard maps and granting construction permits²⁰
- following preventative precautions and taking risk into account is crucial in preventing local authorities from being attacked in the case that an event occurs on land that was granted building permissions
- this helps prevent greater risk in the future by preventing construction of buildings in potentially risky areas
- prevention of risks in France (in general) is good because there are substantial prevention efforts (such as the PPRN)

In contrast, a fair number of negative statements were given by a wide range of key informants (across sectors and different vertical levels) about there being too much of “the big umbrella” and that this (especially when termed as the “principle of precaution”) is very

²⁰ When applying this to planning, this translates to the prohibition of construction or the opening of an area to urbanization. One cannot predict when a flood will happen, how much power it will have, and what damages it may inflict. In making studies of the risk, there are some methods to approach uncertainty. Some informants in territorial planning state they aim to maximize the risk by taking into account the precautionary principle.

characteristic of French culture. The main points of these statements are summarized as follows:

- it is in general not good to forbid everything, but there are examples in which regulations are put in place and decisions are made (for example at the prefecture level) without paying attention to local information and without the influence and knowledge of mountain culture
- especially higher level authorities in larger cities (not in the mountain areas) can make bad decisions that affect mountainous areas when taking too much precaution
- who is clarifying the risk determines whether the “umbrella is opened” and to what extent
- this issue became much more prevalent, and “the big umbrella” was more often used after the violent storm Xynthia in 2010
- to avoid the above, decisions should be made based on best knowledge of the local situation
- “the big umbrella” is used in general in order to remove responsibility and potential blame in case of any potential event or accident, especially as mayors can be liable and even go to prison if found at fault and therefore are incentivized to take maximum precaution
- this is stated as a reason for too many laws and that old laws are not changed but remain intact, because no one wants to take responsibility for changing or removing regulations
- because there is no such thing as 100% no risk (there is still risk), people must have knowledge and be cautious and still be permitted to live in these areas (referring to the Ubaye Valley and the mountains in general)
- some stated there is too much prevention (in general for France) and others that the implementation on the ground of the principle of precaution is not done well, although it is part of the French constitution

4. Some of the priorities of the local level that should be and are often taken into consideration include:

- when granting building permits, attention is to be paid to the importance and protection of agricultural lands and landscape (including small aesthetic projects in the village like flower planters), especially as part of the identity of the valley and of each hamlet and village
- keeping local economies alive by increasing the population and in general focusing on how to stimulate these economies; because 1) they (as local authorities) have greater

influence over this than they do over trying to control hazards; and 2) once the military left, this left a void in the community and a need to revamp the economy²¹

- importance of local level municipal authorities to listen and be available to the people (point made by these authorities themselves)
- the road is a central point of the local life and of local organization, especially in the mountains
- human and economic elements tend to take higher priority than protecting the environment (protecting people comes first)
- sustainability overall is a present issue but on the scale of the individual person is lower priority than the desire to build a house (higher priority than biodiversity); however, sustainable development and the priority placed on this seems to be increasing in general and can be seen through more value attached to zones for rivers, coastal areas, and landslides that should be less urbanized
- weather and paying attention to the weather is seen as very important, especially as it is connected to tourism, the largest and most important local economic sector
- efforts to boost tourism are also important, especially (according to some community informants connected to the Barcelonnette Tourism Office) this has been recently in decline
- an important issue that is considered every spring is how much snow and rain there is, and if it is warm (connected to how fast the snow is melting), because even if there are not large quantities of snow, if it melts in only a few days and there is also rain, this is very dangerous
- although it is very rare that the state will permit an area to be developed that is a risk zone in some cases this is allowed due to key interests of commune such as development of tourist sites
- places of cultural importance (theaters, sporting facilities, etc.) are also prioritized, as can be seen in the focus on these elements in the competition (and winning entries) of the “Barcelonnette 2020-2030” vision

Specifically, with where risks and hazards fall within the priorities, there is a general indication that these items are not necessarily a high priority when compared with other issues including: family, general health, and employment. A general point was made that risk could be within the top ten concerns for local authorities in decision making, especially because they are required to take these into account, but that these authorities must

²¹ There are projects underway by the CCVU to help remedy this issue, but time will tell if these projects are successful, including projects in the Craplet area where Séolane Barcelonnette is located such as the transfer of the high school and the fire department there. Some state funding is provided for these projects.

consider the overall safety and security of the population and that (again in general) one cannot live with risk always at the forefront of one’s thoughts. At an individual level, risks and hazards might be in the middle of the list for some people or at the bottom potentially for others; although this depends on if they have been personally affected by an event and if it is during the few days a year when the river is high. The extent to which these risks and hazards are included within the needs and priorities of the local level (both for individuals and the community as a whole) depends on the level of urgency. Sometimes this also means that local authorities will prefer to invest money into projects that do not have a focus on prevention.

In terms of dealing with and addressing characteristics of the local level with respect to crisis and overall risk management, attention is paid to the above stated priorities and additionally must consider the fact that these local areas have limited staff and limited financial resources (e.g. not enough money in individual communes limits ability to construct and repair dikes). Local authorities know the issues and priorities; however, given limitations that go along with the needs of these small rural localities efforts to integrate these needs have been made through the organization of activities at the intercommunal level. This represents a tremendous undertaking as these communes also at times resist the change to a more intercommunal level, because they want to retain their power and identity. Despite resistance, many informants communicate this as a positive direction as these efforts help small communes to pool resources and better address needs that otherwise would not be met, for example in:

- managing larger events and ensuring roads are clear if evacuation is needed (they are isolated in the case the main road along the Ubaye is blocked)
- with planning land use and landscape throughout the valley
- for maintaining the height of the river and general, more global (across the communes) management of enhancing local economic development
- establishing a more coherent understanding of risk in the valley

One other example of integrating local level needs is found in public consultations led by consulting companies, in which discussion and agreement with the population is crucial. Consultants go to the community and try to understand the community’s needs, especially in considering priorities like the importance of landscape and agriculture and the limited buildable areas. One example of keeping the interests of the commune in mind was given between a commune and a consulting firm who tried to help the commune make the plan (PLU) with the assumption that the commune achieves its goal in reversing its declining population.

The aforementioned “problem of proximity” also surfaces in the integration of local needs, as the physical closeness and small town feel of these communes (in which everyone tends to know everyone) applies pressure on mayors in making decisions such as determining whether land is constructible or non-constructible. Although one can argue this proximity encourages consideration of “local needs”, organization and territorial planning at the intercommunal level is seen as also helping to avoid favoritism and potential negative consequences.²²

5. Limited evidence was presented for this indicator. The strongest issues connected to livelihoods are related to tourism, and to agriculture, which are stated as the most important economic sectors, tourism being the more important of the two. In developing strategies there are conflicts of interest between farming and urbanized areas, especially because urbanized areas are more expensive than farming areas. This is in part why it takes much political courage on the part of the mayor to change land use types; for example, the creation of a PLU, as the PLU might make some of the urbanized land non-constructible. One other issue is that crops can be flooded during a flood event and that the Syndicat will not attempt to protect the crops. One key informant stated that some people have a problem in understanding there is no protection for the crops. In the case that they must be flooded it is possible to get some but not much compensation. The aforementioned issue of “the problem of proximity” can also be applied for this indicator. In this respect, the nature of everyone knowing everyone at the local level can equate to decisions made to protect economic interests more so than environmental. In general, efforts toward bolstering the economy and creating jobs and attracting industry are also encouraged in future strategy development for the valley and especially in Barcelonnette.

11.3 Connection mapping and explanation

A connections map was created using the same interview evidence base and in the same way as the Romanian case study (see Figure 11.1 for map). In the case of the Barcelonnette catchment, connections between categories using this evidence demonstrated Openness & Transparency as well as Risk Culture, Effectiveness, Coordination, and Resources as highly connected categories. Efficiency, Accountability, and Cooperation appeared to have significant connections, while Trust, Strategic Vision, and Equity seemed to have fewer connections relative to the others.

For **Openness & Transparency** connections were found with all indicators (one through five). Indicator 1 was found in terms of availability and accessibility of information, high-

²² This is again why the prefect changes every three years to avoid too much connection and influence from the local population.

lighting some important issues in cases in which information is not readily available (connecting primarily to Resources and Cooperation). Connections with Indicator 3 (dissemination to a wide variety of audiences) were made with Participation, Coordination, and Risk Culture. Connections with Indicator 4 regarding adequately available information for the public was connected to both Risk Culture (regarding whether individual actions are taken based on this information and the need to inform but not scare the population) and Resources (good level of information through networks). The fifth indicator was connected to Resources in the ability to make ensure multiple information sources.

For **Accountability**, several connections were made to Indicator 3 with respect to holding actors accountable for their roles and responsibilities. Connections were drawn from this to Effectiveness Indicator 5 in terms of the adherence of regulatory frameworks in practice. One example given shows how monitoring of an actor helps keep not only the actors accountable but helps ensure regulations are being enforced. A connection to Risk Culture regarding knowledge and awareness was found with the issue of whether individual persons are held accountable in releasing risk related information parcels they would sell to others (also identifying a missing issue not currently covered by the category and indicator system in terms of citizens and not only authorities being held accountable).

For **Participation**, the use of local knowledge was used as a connecting point to Resources.

Strategic Vision had connections to Accountability and Risk Culture with two positive examples; one related to maintaining the projected mission of an important actor; and the other in connection to the needs of the population with the creation of the Barcelonnette 2020 vision.

Effectiveness had several connections with respect to indicators for targeting flexibility and redundancy and Indicator 5 focusing on adherence of regulatory frameworks in practice. Several of these connections are made with Coordination. One of these connections highlights a triangle between Effectiveness, Coordination, and Resources in which the lack of resources affects the implementation of tasks and the ability for them to achieve their purpose in practice. The other connection highlights another point, the issue of close spatial proximity of local authorities with population and how that can influence the issuing building permits (supporting the evidence base for the common issue of “the problem of proximity”).

Efficiency appeared to have a considerable number of connections to a variety of other categories and seem to have at least one connection to all but one of its indicators. Most of these connections were tied to efforts for greater organization and operation at the in-

tercommunal scale, highlighting an important and influential point for this particular case. Connections originating from Trust also touched on the issue of adherence to the rule of law and connected to Effectiveness, particularly with respect to trust in authorities and whether they follow regulations in practice.

For **Resources**, many of the connections originating from this category were found in the first indicator and generally dealt with the lack of resources, particularly funds, that limited capabilities (like adequate personnel and assessment capabilities connecting to Effectiveness and Coordination) and the feeling of marginalization (in connection to Equity). The connection to Openness & Transparency with regard to examples of existing platforms and inventories provided good examples and highlighted improvements in the availability of information.

Connections for **Coordination** were found with the first indicator in terms of positively perceived legally required practices and were connected to the first two indicators for Resources. One of these connections drew attention to an important issue in that deficits for key actors can affect all actors in the rest of the chain of command (providing evidence for “key actor pressure points”), while the other pointed to the specific issue of the inability to share, and in general coordination amongst the different communes. One connection was found originating with Cooperation while many were found for Risk Culture.

The connection originating in **Cooperation** was found in connection to Coordination which demonstrated how informal interactions and tasks support the positive perception of the formally required interactions between certain actors.

For **Risk Culture**, many connections were drawn originating from Indicators 1 (regarding self-initiated actions) and Indicator 2 (regarding knowledge and awareness). Connections from Indicator 1 were found with Openness & Transparency and in connection to Strategic Vision. For Openness & Transparency these connections deal with information that encourages the population to be well-informed but also points to the fact that well-informed does not necessarily equate to the taking of self-initiated actions. The connection to Strategic Vision brings attention to a unique point for this particular case in that the research conducted within the case study (at Séolan Barcelonnette) has encouraged and informed local authorities and the population, and has helped improve and enable more long term thinking. Connections from Indicator 2 for Risk Culture were made to a wide variety of different categories. In connecting to Effectiveness, awareness of the places in which risk is high and construction prohibited is supported in connection to the strictness of regulations and the fact that these regulations are often upheld in practice (connecting to Indicators

4 and 5 and Effectiveness).

Connections to Participation from Risk Culture point to positive change in the population becoming more interested in increasing awareness, becoming more involved, and in local knowledge serving as a tool and empowerment for this awareness. This local knowledge is also part of the connection between Risk Culture and Openness & Transparency, highlighting lived experience and connection to place as part of local knowledge and a source of information. Local knowledge also acts as a connecting point to Resources, providing an informational resource that can remedy lack of expertise when needed. Improving awareness of risks throughout the Ubye Valley and how this might overall help improve cooperation amongst the communes served as a connecting point between Indicator 2 for Risk Culture and Cooperation. A key issue was found with respect to connection to Equity, drawing attention to the fact that lack of awareness of risks for some groups such as tourists and newcomers can make these groups potentially more vulnerable than other groups. One last issue addressing connections for Indicator 2 was found in its connection to Efficiency. This connection communicated that small communes have adequate knowledge to deal with small events; however, adequate capacity to handle larger events is more appropriately found at the intercommunal level. A connection from Risk Culture Indicators 3 and 4 was made to Resources in identifying conflicting priorities with respect to prevention and needs of the local level.

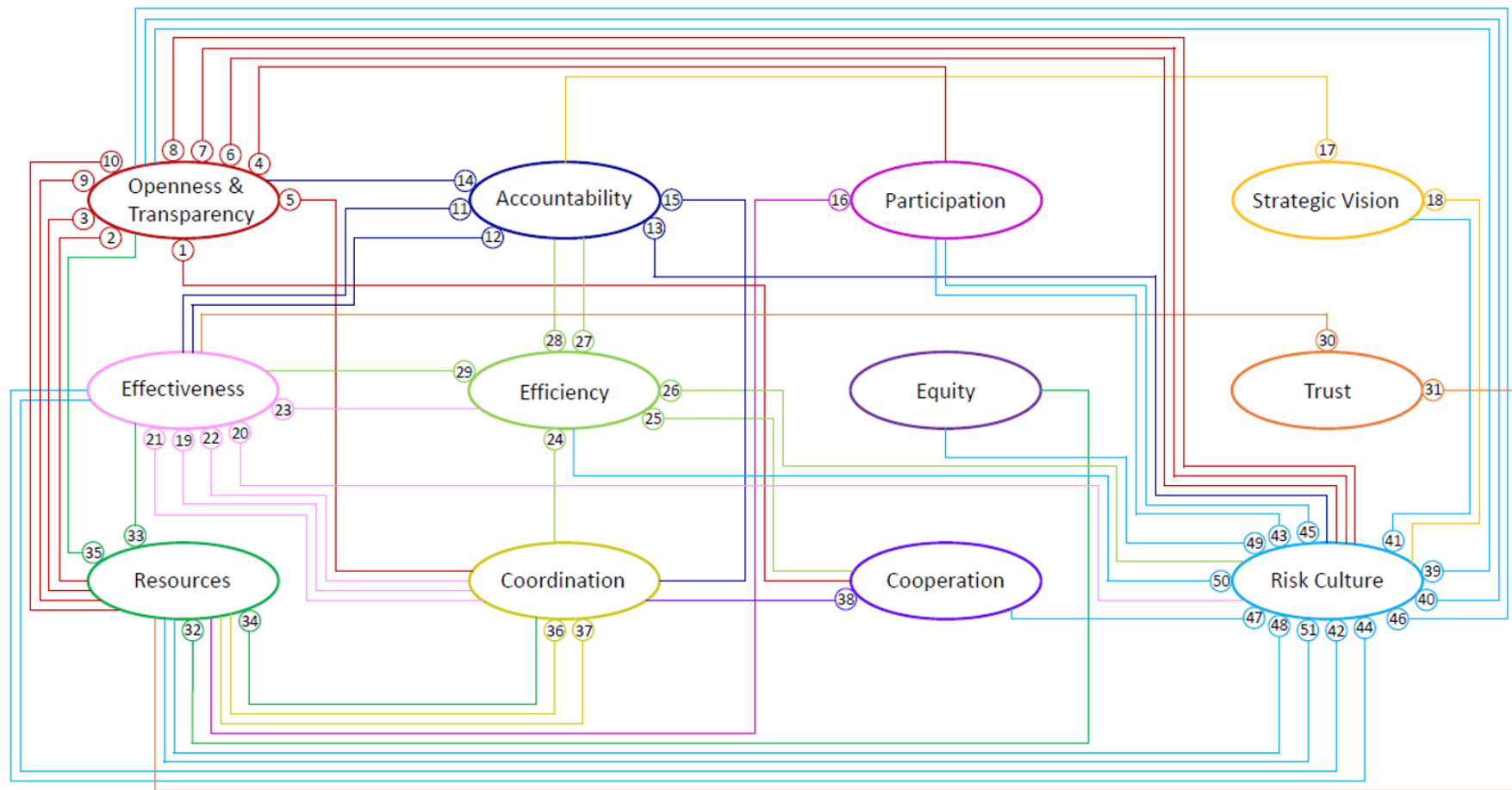


Figure 11.1: Connection mapping for Barcelonnette catchment from interview transcript evidence base. Colors and number bubbles are used to indicate which indicator in one category is connected to another in another category. For example, for #1, this originates in an indicator for Openness & Transparency and is then connected to the evidence base of a different indicator in the Cooperation category. Explanations for each connection are provided in the follow texts, with the numbers as a reference point between the explained connection and the place in which one can view this on the diagram.

Openness & Transparency

- (1) Openness & Transparency (Indicators 1 and 3) connected to Cooperation (Indicator 4): related to availability (Openness & Transparency Indicator 1) and dissemination (Openness & Transparency Indicator 3), people are not given enough information on what is going on with plans for what is done on the river
- (2) Openness & Transparency (Indicator 1) connected to Resources (Indicator 2): some information is not openly accessible and must be paid for, including meteorological data
- (3) Openness & Transparency (Indicator 1) connected to Resources (Indicator 1): lack of information via lack of PPR can be problematic
 - further explanation from evidence: PPR is helpful; but if non-existent, it becomes a political issue; must rely on a combination of documents and more discussion with state authorities; not as straight forward a process; can also make creating a PLU difficult; communes should make other studies if there is no PPR, but this does not always happen (to provide some of the other documents they would consult given no PPR) (sometimes this depends on the financial means and priority authorities place on this)
- (4) Openness & Transparency (Indicator 3) connected to Participation (Indicator 3): awareness raising through participation in public events (e.g. exhibitions, forum discussions and presentations) with scientists as Séolane Barcelonnette, local literature produced by historical society (L'Association Sabença de la Valéia)
- (5) Openness & Transparency (Indicator 2) connected to Coordination (Indicator 1): communication of risk information is sometimes given to the public by consulting bureaus. They try to make the technical parts understandable for the public
- (6) Openness & Transparency (Indicators 3 and 4) connected to Risk Culture (Indicator 2): there should be more meetings to inform the public to improve the knowledge of the public (discussed in context of obligations of local authorities to organize and hold these meetings regularly) (connected to dissemination (Openness & Transparency Indicator 3) and having enough information (Openness & Transparency Indicator 4), and to level of population awareness (Risk Culture Indicator 2)
- (7) Openness & Transparency (Indicator 4) connected to Risk Culture (Indicator 1): regardless of having enough information, this does not mean that people will take action concerning risk or changing behavior
- (8) Openness & Transparency (Indicator 4) connected to Risk Culture (Indicator 2): there is a need to balance between providing enough information and not scaring the population
- (9) Openness & Transparency (Indicator 4) connected to Resources (Indicator 2): there is enough public information available at the mayor's office, and there is a generally good network (i.e. people are well connected)
- (10) Openness & Transparency (Indicator 5) connected to Resources (Indicator 1): the municipal offices have access to and make use of multiple sources of information including from the RTM and the population in addition to the documents they have

Accountability

- (11) Accountability (Indicator 3) connected to Effectiveness (Indicator 5): issue that designation of risk zones (red, white, or blue) are different across different administrative boundaries when normally this should not be physically possible (e.g. along the same boundary line)

- (12) Accountability (Indicator 3) connected to Effectiveness (Indicator 5): for the RTM, objectives are reviewed with the state every five years to enable a way to keep track of their progress
- (13) Accountability (Indicator 3) connected to Risk Culture (Indicator 2): (related to missing issue of trust between different community members (e.g. in terms of whether people are truthful about the risks to the plot of land they are trying to sell)) there is an issue when people buy a new home in the area when they are not told by the owner of potential risk and are not knowledgeable about the risk – this is connected to holding private citizens accountable in providing this information when they sell their land
- (14) Accountability (Indicator 3) connected to Openness & Transparency (Indicator 3): the DDT acts as an overseer of the process of creating the PPRN and are concerned with ensuring that the elected representatives and the inhabitants are well informed and that the process for the elaboration of the PPR is done well (that the study, the finalization of the document, the approval of the prefect and the correct date are conducted properly)
- (15) Accountability (Indicator 3) connected to Coordination (Indicator 5): argument that prefecture level should first update their plan before asking communes to update theirs

Participation

- (16) Participation (Indicator 4) connected to Resources (Indicator 1): use of local knowledge to determine where to relocate people during crisis

Strategic Vision

- (17) Strategic Vision (Indicators 3 and 5) connected to Accountability (Indicator 3): example of maintaining timeline and structure with RTM checks (check with state authorities every five years on progress and accordance with mission)
- (18) Strategic Vision (Indicator 5) connected to Risk Culture (Indicator 4): Barcelonnette 2020 Vision as an example of strategy and reflection of solutions that take consideration of needs and priorities of the local level

Effectiveness

- (19) Effectiveness (Indicator 4) connected to Coordination (Indicator 1): sometimes there are exceptions in interpreting the law in determining what are buildable versus non-buildable areas
- (20) Effectiveness (Indicator 4) connected to Risk Culture (Indicator 2): local authorities sometimes annoyed with inability to permit building in areas where there are restrictions (there are many areas with restrictions)
- (21) Effectiveness (Indicator 5) connected to Coordination (Indicator 1) also connected to Resources (Indicator 1): lack of resources affecting implementation of tasks, however solution sought through enhancing coordination at the local level (i.e. connecting and coordinating the resources of the small communes at an intercommunal level, e.g. through the Syndicat)
- (22) Effectiveness (Indicator 5) connected to Coordination (Indicator 2): issue of (close) proximity of local authorities to population (e.g. granting building permits). Role and powers of the prefect help overcome potential negative effects (e.g. inappropriate granting of permits)
- (23) Effectiveness (Indicator 5) connected to Efficiency (Indicator 1): local communes are more able to fulfill requirements by working at an intercommunal level (i.e. intercommunal level enhances efficiency and enables a more appropriate level at which to take action)

Efficiency

- (24) Efficiency (Indicator 1) connected to Coordination (Indicators 2 and 5): attempts to enhance efficiency by working at intercommunal scale
- strengthen “bottom” level (commune level) through greater coordination and also overcome weakness of individual communes in the case of larger events
 - enhance and create a global knowledge for the Ubaye
- (25) Efficiency (Indicator 1) connected to Cooperation (Indicators 1 and 4): attempts to enhance efficiency by working at intercommunal scale
- Intercommunal level is deemed most appropriate level for cooperative efforts (why Syndicat was created), especially for planning and funding different measures and for generating necessary studies for assessment
- (26) Efficiency (Indicator 1) connected to Risk Culture (Indicator 4 and 5): working at intercommunal scale to have greater efficiency while still integrating needs and priorities of the local level, while also helping overcome issue of proximity (previously mentioned)
- the mayor can be greatly influenced by the close connection he or she has to the population as these communes are very small, and the mayor must therefore be very “courageous” and politically strong to not give in to potential favoritism. Having decision-making at a higher level (intercommunal) can also assist these potential issues
- (27) Efficiency (Indicator 1) connected to Accountability (Indicator 1): too many laws make processes sometimes complicated, but this is also an issue that efforts in working at the intercommunal level are trying to overcome
- (28) Efficiency (Indicators 1 and 2) connected to Accountability (Indicator 5): pooling of resources at more appropriate level (e.g. intercommunal) in order to maintain structural mitigation measures
- (29) Efficiency (Indicator 5) connected to Effectiveness (Indicator 4): timing and process for changing the PPRN is long and complicated

Trust

- (30) Trust (Indicators 1 and 2) connected to Effectiveness (Indicator 5): trust in adherence to the rule of law, especially trust in authorities to follow regulations
- (31) Trust (Indicator 3) connected to Resources (Indicator 2): good example of trust with exchange of information between consulting offices

Resources

- (32) Resources (Indicator 1) connected to Equity (Indicators 2 and 5): lack of resources as factor for being a “marginalized” area as compared to other areas that are higher priority and or not as risky (e.g. feeling that they are not given enough resources as their area is lower priority in comparison to other areas, such as coastal areas)
- (33) Resources (Indicator 1) connected to Effectiveness (Indicators 4 and 5): limited assessment capabilities for hamlets due to limited resources (e.g. in terms of assessments needed for adapting to changing environmental conditions (Indicator 4), and inadequate funding and or competencies occasionally resulting in poor assessments at the local level and additionally not enough funding to expropriate properties that are not conforming to legal requirements for risk (Indicator 5))

- (34) Resources (Indicator 1) connected to Coordination (Indicator 2): not enough funds or personnel to complete what they are asked to do leading to efforts toward and establishment of more intercommunal coordination (also connected to Effectiveness 5 (“rule of law”) and Efficiency 1 and 2 (pooling of resources and most appropriate level))
- (35) Resources (Indicator 3) connected to Openness & Transparency (Indicator 1): examples of existing platforms and inventories for exchanging information including: informational platforms that are open to the public from the BRGM (platform featuring risk information that was previously dispersed into one place so the public knows what exists, access through data itself through BRGM, following INSPIRE Directive), the RTM (online database of information and measurements about all past events in the valley from the last 100 years), and through the DICRIM given to the public via the Prefect (Document d’Information Communal sur les Risques Majeurs, and includes information on: what needs to be done, resources, where resources are, and locations of meeting points)

Coordination

- (36) Coordination (Indicator 1) connected to Resources (Indicator 1): deficits for key actors (e.g. the RTM) affect all actors in the chain of command (e.g. if they lack resources such as adequate personnel to cover the valley)
- (37) Coordination (Indicator 1) connected to Resources (Indicator 2): example of deficits in sharing and coordinating equipment amongst the different communes

Cooperation

- (38) Cooperation (Indicator 3) connected to Coordination (Indicator 1): cooperation with the RTM is strong and positively perceived by other authorities (e.g. also because the RTM assists legally required tasks through information interactions)

Risk Culture

- (39) Risk Culture (Indicator 1) connected to Openness & Transparency (Indicators 4 and 5): population is encouraged to be informed through museum exhibits, forums and seminars at Séolane Barcelonnette, and information from literature produced by the local historical society L’Association Sabença de la Valéia (similar to connection between Openness & Transparency and Participation represented in number five)
- (40) Risk Culture (Indicator 1) connected to Openness & transparency (Indicators 3 and 4): connection regarding information about individual actions that can be taken against risk. The key point is that it is not necessarily in people’s minds that they should protect their homes; and some people do not know where to go outside of the information presented; for example, at Séolane Barcelonnette, where they can find information about what actions they can take themselves against risks (knowledge about risk information, especially for self-initiated actions on individual level)
- (41) Risk Culture (Indicator 1 and 2) connected to Strategic Vision (Indicator 1): Efforts from the research conducted here (e.g. from scientists at Séolane Barcelonnette) have encouraged informed and heightened awareness for authorities (not just the population) and have encouraged better informed strategy development based on this information, with more long term thinking than what was previously a more short term focus (Strategic Vision Indicator 1, also related to Indicator 3 for Strategic vision)

- (42) Risk Culture (Indicator 2) connected to Effectiveness (Indicator 4 and 5): The local level population and authorities are aware that there are many places with risk and they know they are not permitted to develop these places in terms of construction because the regulations are very strict (Indicators 4 (regulations not flexible) and 5 (regulations upheld in practice))
- (43) Risk Culture (Indicator 1 and 2) connected to Participation (Indicator 2): connection in point stressed that people are starting to become more interested in becoming more aware and more involved (e.g. stressed as starting to take shape within the culture)
- (44) Risk Culture (Indicator 2) connected to Effectiveness (Indicator 3): People know they live with risk (there is a sense of local risk awareness), and this knowledge influences how they respond to early warning systems (especially in the case of what to do to evacuate)
- (45) Risk Culture (Indicator 2) connected to Participation (Indicator 4): Potential influence of local knowledge, which also serves as a tool of empowerment and awareness
- (46) Risk Culture (Indicator 2) connected to Openness & Transparency (Indicators 4 and 5): Awareness through lived experience provides connection to place, highlighting local knowledge and place connection to sources of information
- (47) Risk Culture (Indicator 2) connected to Cooperation (Indicator 1): improving awareness of risks in the valley might help improve cooperation efforts and help encourage communes to work together
- (48) Risk Culture (Indicator 2) connected to Resources (Indicator 1): use of local knowledge and awareness as informational resources, which can also remedy lack of expertise if necessary (e.g. people know where problems are)
- (49) Risk Culture (Indicator 2) connected to Equity (Indicators 4 and 5): issue that knowledge and awareness of risks is limited for tourists and newcomers makes these groups vulnerable
 - especially for new inhabitants, this can be overcome to a certain extent through the strong social networks at the local level (exchanging information with your neighbor); however, there is nothing organized in providing newcomers with this kind of information (e.g. information that the people who are from here and have lived here for a long time have built up in disaster memory and experience)
- (50) Risk Culture (Indicator 2) connected to Efficiency (Indicator 1): local areas have knowledge enough to deal with small events but do not have this to an adequate enough capacity to deal with larger events
- (51) Risk Culture (Indicators 3 and 4) connected to Resources (Indicator 2): conflicting priorities of prevention and needs of local level, as local authorities tend to want to allocate money for other efforts than prevention. This is supported also by the fact that there is some funding for structural prevention measures from the state

11.4 Conclusions

The purpose of this main case study chapter and the detailed contents it provides is held similarly to the previous chapter with the Romanian case. Both cases provide key input for the comparative and reflection chapters that follow. However, within the conclusion and brief recounting of key points of this chapter, acknowledgment of connections are highlighted in the following paragraphs to the previous work conducted in the Mountain Risks

project by Marjory Anginard (Anginard June 2011). This previous work employed survey sampling among the population (household surveys) via post. The topics addressed within this study included knowledge and information about risks and perceptions the public has regarding actors involved in risk governance; the key being public perception as a primary topic.

Several connections can be drawn to the findings of this work in the research presented within the current thesis. One such point lies in the fear of particular hazards. In the work of Anginard, it was found that earthquakes were more feared than floods, which in the research is observed as potentially attributable to the “fear of the unknown”. During the fieldwork of the present thesis, earthquakes were also mentioned by informants and particularly by community leaders as being a feared hazards that could come without warning, and were more greatly feared than potential flooding. However, it is important to note that this may have also been attributable to the fact that a minor earthquake occurred in the case study site the month prior to the primary field site visit. One other point is that both the present research and in the case of the research conducted within the Mountain Risks project, characteristics and the French system are still described as centralized, and more oriented towards prevention. The present thesis also elaborates on some of the potential issues with this focus, also in respect to the principle of precaution described as “the big umbrella” by many key informants both at local and “regional” level. Regarding availability of information, it was found in both the of the previous research and present that there are multiple forms of information available (although currently there are more sources of information available than previously), but that this does not guarantee information reaches individuals and (as an expansion provided by this research) does not guarantee that self-initiated actions will be taken by individuals even if this information is received. One last key point and connection to the previous research lies in the trust place in different authorities at different levels. Results from the previous research indicated that actors working in the field were considered more trustworthy than other authorities, and explicitly mentioned the RTM as one such authority. This is also supported by the present research; however, it is also expanded in that the perception of (not only the public) but also other authorities at both local and “regional” levels is held to be the same in terms of trust place in field actors and specifically the RTM.

Within the present thesis, the availability of resources (and specifically informational resources) is a key component of Openness & Transparency and one of the most connected categories for “good” risk governance within this case. This was also found to be in direct connection to Risk Culture with respect to knowledge and awareness of risks and hazards. Risk Culture proved to be the most connected category addressing issues such as awareness, encouragement of self-initiated actions, focus on prevention, and attention to livelihoods

and needs of the local community. Effectiveness also proved important, as it appeared that law is perceived to be very strong within this case. One other key point that touched on a variety of other issues was found in both Coordination and Cooperation efforts at the intercommunal level, and the push for improving intercommunal organization and pooling of resources. These points and others are presented in a comparative light within the next chapter along with the other main case study and input from satellite cases.

Chapter 12

Multi-case comparison: main and satellite cases

This chapter provides direct support to the exploratory nature of the research approach, giving insight and helping address a number of research questions and combining evidence from multiple cases to work toward a greater understanding of “good” risk governance. In conducting the analysis across cases using the comparative tool, the research is able to investigate what can be considered “good” risk governance practices within and among the different cases, directly connecting **RQ1.a** *Is what is considered “good” risk governance practices, the same in each case study and among the different actors?* This research question, as well as the third and second research questions, are addressed within the first section of this chapter. **RQ3** *Do the most relevant regulations (both formal and informal) which make up the policy framework for disaster risk management dramatically differ?*, and **RQ-2** *Do the key actors and the distribution of their roles and responsibilities differ among the study sites?* are similarly addressed within this same section through key issues that deal with actors and the regulatory frameworks in which they operate.¹ This section also provides observations on the organization of different types of actors, focusing on the macro categories presented in Chapter 8 in order to at the same time reflect the actors’ primary field of responsibility (e.g. emergency management, planning and sectorial management, administrative focus).

The chapter also addresses **RQ4** and **RQ4.a** *Do these factors (cultural factors which influence risk decision-making processes (e.g. aspects of political or organizational culture)) substantially differ among the case study sites?* These are addressed through a discussion of the understanding of the concept of “risk culture” provided in the last part of Section

¹ In referring to the section in Chapter 1 on what the thesis does and what it does not, focus in addressing these questions is placed on key issues and not on a full analysis of all relevant regulatory frameworks and all possible actors.

12.1. Throughout this chapter, the reader is also encouraged to consider the purpose of the chapter with respect to the methodological underpinnings elaborated in Chapter 2; specifically that comparison (and especially comparison of cases) helps to derive shared meanings and interpretations in order to understand a greater phenomenon (in this case “good” risk governance). This approach enables greater potential for revealing common understanding, which is of value in itself given that:

We should, in other words, anticipate the social reality that we live in a world of multiple meanings or interpretations. This means that we should be more surprised to find shared meaning, what Sir Geoffrey Vickers (n.d.) termed ‘the matched signal,’ than we are to find differences in interpretation, the common focus of analysis (Yanow 2007, p 115)

The quote harkens to the complexity of multiple meanings, connecting to the social complexity of a given space and underscoring the uniqueness of commonality across a landscape of interpretations. It is the identifying of differences, but more importantly these commonalities, that are the key focus of this chapter.

12.1 Comparison of key issues by “good” risk governance category

Within this section, it is important for the reader to remember a point made in the background literature chapter that all member states, and indeed all regions, are at different stages and starting points in their efforts to enhance risk reduction capacities as well as to adapt to potential impacts of extreme events. The purpose of the comparison is, therefore, not to determine which of the cases are “better” or “worse” in their current process of strategy development and governance of risks, but to identify what are some of the common factors (patterns so to say) that can be found across cases with respect to understanding “good” risk governance in practice. The section also helps the reader to understand, furthermore, what are key points but also unique factors and issues attributed to an individual “space” (or case). The information provided and compared is a product of the perspective of the information given by the key informants within each case study site. Satellite cases are highlighted in bold text for easier recognition of inputs.

Openness & Transparency:

There are generally good examples of websites (in all cases), rich in information with much information available to the public. However, there are issues with reaching certain parts of the population, especially the elderly and people who do not have access to Internet (as was explicitly stated in the Romanian case). This would therefore require more physical

information points, like bulletin boards or announcements after mass or church (as in the **Polish** case). This is also an issue for new inhabitants and tourists (as is the case for the French site). For both the **Polish** and French cases, good examples of multiple sources of information were found.²

There were mixed views as to whether the public have adequate information or not. This depended upon the key informants interviewed (including the community leaders serving as a proxy for the public). A **general trend**, however, was observed that informants working with administrative capacities generally felt that the public had adequate information; while informants working within planning and sectorial management as well as informants within emergency management tended to think the public does not have adequate information. Community leaders tended to be quite mixed in their perception of this topic, with some feeling far more information was needed, and others feeling adequate information is provided. There was also concern expressed about having too much information that might cause fear and panic (explicitly expressed in the French and **Italian** cases by local level authorities, in the French case also by community leaders), and the need for a good balance of information in general.³ This latter point was also stressed as a concern by several local and regional authorities, especially in the case of the French case study.

Openness & Transparency	
Nehoiu catchment (RO)	Barcelonette catchment (FR)
<ul style="list-style-type: none"> ● Good examples of informative websites ● Improvements in availability flood risk and hazard information at county level (need local) ● Potential expansion of SMS alerts ● Unclear whether public has adequate information (informant perspectives vary) ● Some information still “secret” ● Lack of resources limits dissemination abilities 	<ul style="list-style-type: none"> ● Good examples of available and multiple-source information (also and esp. websites) ● Importance of and efforts for understandable communication to public ● Unclear whether public has adequate information (informant perspectives vary) ● Specific issue: informational needs of tourists and new inhabitants ● Issue whether more public meetings needed

Table 12.1: Comparison for Openness & Transparency

Although secret information was not so much an issue in the French case as it was in the Romanian case, the common thread found from the same key informant types (namely those associated with geological surveys and risk assessment actors) is that data that is created with public funds must be made available to the public. In all cases there are ongoing improvements in the availability of certain information (this is a continued and important process in all cases with respect to enhancing risk and hazard information).

² See Transcript P-1 Wieprz municipality Mayor; Transcript P-13 Municipal Technician and Volunteer Fire Brigade, and Civil Defense Wieprz; Transcript P-14 Priest Wieprz

³ See Transcript I-1 Mayor Malborghetto-Valbruna

In the **Polish** case this was related to the development of an extensive landslide hazard inventory (publically available).⁴ In the Romanian case this was represented in the initial development of a similar (landslide hazard working toward eventual risk) inventory. For the **Italian** case this was found in an emergency information and planning information based inventory managed at the regional level with different user access interfaces⁵; while in the French case this was found with the platform developed by the BGRM in cooperation with a range of other authorities.

Accountability:

In general, regulatory guidelines were perceived as clear for the two main cases and for the Polish case (with a few exceptions). However, the clarity of regulations did not translate to the ability or feasibility of their implementation. An example of that in the French case is the perception that regulatory guidelines are too many and also too complex. In the Romanian case, regulations were even stated as being clear and good (with the exception of legislation for landslide assessment); however implementation proved to be an issue related to resources. For the **Polish** case, even though regulations were generally perceived as clear by informants, some issues were voiced with who is responsible for providing funds (for example for recovery after an event) as each authority would prefer to have other authorities be responsible for funds.⁶ For the **Italian** case, many issues were present including a need for greater clarity and general understandability of regulations, perception of too many regulations (similarly to the French case), and conflicts between local and regional regulations.⁷

Accountability	
Nehoiu catchment (RO)	Barcelonette catchment (FR)
<ul style="list-style-type: none"> ● Regulatory guidelines generally clear and good ● Generally no conflicting overlaps of responsibilities within same horizontal levels ● Some checks and balances for accountability ● Lack of fine enforcement (local level) ● Specific issue with landslide assessment regulations ● Monitoring of terrain rough and limited ● Several issues with maintenance of mitigation measures 	<ul style="list-style-type: none"> ● Generally no conflicting overlaps of responsibilities ● Many mechanisms for monitoring and reporting ● Regulatory guidelines generally clear, but too many and too complex ● Several issues with maintenance of mitigation measures in terms of funding

Table 12.2: Comparison for Accountability

⁴ See Transcript P-19 Polish Geological Institute

⁵ See Transcript I-12 Regional Civil Protection

⁶ See Transcript P-13 Municipal Technician and Volunteer Fire Brigade, and Civil Defense Wieprz

⁷ See Transcript I-13 Regional Soil Defense FVG Trieste; Transcript I-16 Private Planning Firm Architect; Transcript I-1 Mayor Malborghetto-Valbruna; among many others.

In terms of overlapping responsibilities, this was not seen as an issue in the two main cases in general (in terms of conflicting overlaps), nor in the **Polish** case. However, in the **Italian** case some issues were expressed with the expansion of the role of the regional civil protection. In brief: in time of emergency civil protection is in charge and this is very clear; however, after emergency sometimes civil protection still operates as if it is a continuation of the emergency phase.⁸ In consequence and for example, large structural measures are installed by the civil protection, but it is argued that this may be better managed (and decision-making powers handed back over) to the municipalities who may decide a smaller measure will suffice. In the **Italian** case there had also been some overlaps with who intervenes in the creation of mitigation measures (e.g. hydraulic engineers, forestry department, or civil protection). However, now there is a database that is shared amongst these actors to improve communication and to sort out overlaps.⁹

Although monitoring is more of an issue for the Romanian case, both main cases had specific issues related to funding and maintenance of mitigation measures (connecting accountability in terms of monitoring and reporting to issues and resources). This was also found to be the case in **both of the satellite cases**. However, the **Italian** case study, provides a very extreme example of massive mitigation measures and a general lack of clarity as to who is responsible for funding the maintenance of these measures.¹⁰

Participation:

The level of involvement in terms of participation of the public in **all cases** tended not to go much beyond the level of consultation, with one exception found in the Italian case. This exception was found in a past example of a high level of involvement of the population in reconstruction efforts after the 2003 event (specifically in the construction of large-scale structural mitigation measures). **Across all cases**, however, there were some positive examples of two-way communication. In the Romanian case this refer to improved communication with local leadership and strong integration and reliance on local knowledge for decision-making. In the French case positive examples for consultation were provided, as well as good examples of awareness building campaigns with the public, and especially for children. The emphasis on education for children was an issue voiced in all cases.

As to the question of whether involvement of the public in decision-making activities should be higher, concerns were voiced in both of the main cases. However, the concerns expressed differed. In the French case there was hesitation in having too many people involved in decision-making; while in the Romanian case the issue was more related to a potential lack

⁸ See Transcript I-14 Vice Mayor Pontebba

⁹ See Transcript I-12 Regional Civil Protection; Transcript I-21 Forestry Services

¹⁰ Observations from both preliminary and primary field visits and discussions

Participation	
Nehoiu catchment (RO)	Barcelonette catchment (FR)
<ul style="list-style-type: none"> • Good examples of improved two-way communication (local leadership + village system) • Very strong integration and reliance on local knowledge for decision-making (both levels) • Need for expanding public education activities (especially current efforts with children) • Public involvement low (both prevention and response) 	<ul style="list-style-type: none"> • Good examples of consultation involvement • Good examples of awareness building campaigns (exhibitions, some trainings), efforts with children • No direct involvement in decision-making, hesitation in increasing this

Table 12.3: Comparison for Participation

of interest on the side of the public and whether or not the public would take advantage of more opportunities to be involved. In the **Polish** case, some evidence suggests local community leaders would like greater public involvement with respect to hazards (as a general topic).¹¹ Public involvement at the local level in the **Italian** case provided a rather unique situation in connection to volunteer structures. This is related to what was communicated as a result of the extensive volunteer network at the local level.¹²

One positive example in the **Polish** case for two-way communication involved the example of a direct connection to peoples' local policeman in each village (online information with image, where people can go to office hours and discuss).¹³ In the **Italian** case, an example of two-way communication was found in the focal point meetings set up by water basin authority (established in efforts to fulfill the Floods Directive), which are open to all interested parties.¹⁴ Some desire in the **Italian** case was also expressed (by a community member) for more public involvement in terms of planning prevention activities.¹⁵

Strategic Vision:

Evidence for strategic vision appeared to be very different between the two main cases. The difference lies in the general difficulty felt by authorities in the Romanian case in attempting to consider a long term focus, especially for planning, due to the fact that resources are limited and that there are more pressing problems that must be immediately remedied. Similar statements were found in the **Polish** and **Italian** cases. In the **Polish** case, statements were made from crisis management authorities that they would like to

¹¹ See Transcript P-14 Priest Wieprz

¹² Transcripts but also general observation from both preliminary and primary field visits and discussions

¹³ See Transcript P-17 County Police Office in Sucha Beskidzka (Prevention and Traffic and Crisis Management)

¹⁴ See Transcript I-18 Water Basin Authority (Regional)

¹⁵ See Transcript I-7 Community Leader

have a focus on the long term but that there is not adequate funding for this.¹⁶ In the Italian case, informants involved in planning and consulting communicated that there is no money for prevention, and therefore the focus is on emergency unless something occurs, such as loss of life during an event.¹⁷

Strategic Vision	
Nehoiu catchment (RO)	Barcelonnette catchment (FR)
<ul style="list-style-type: none"> Recent progress with sustainable development strategy for town of Nehoiu (flooding not included) General difficulty in having strategic vision and long term planning due to limited resources and more immediate problems 	<ul style="list-style-type: none"> Increased consciousness of risks by public authorities (scientific support for this) Examples of common priority pursuit and structures for future goal orientation (e.g. education especially for children, local knowledge perpetuation, prevention focus, greater intercommunal efforts, vision sharing from regional level)

Table 12.4: Comparison for Strategic Vision

In both of the main cases, however, there was some evidence of development towards future strategy at the local level. This was found in the sustainable development strategy for the town of Nehoiu in Romania and in the development of the Barcelonnette 2030 strategy in the French case. These documents were not investigated in detail, but their existence (which is relatively recent, occurring within the last few years) is a notable point in both cases. Future goals were also stressed by some informants from the **Italian** case, such as the goal of the Regional Soil Defense (to have maps that can be easily updated, be used by the people, and make hydraulic models in following with maps needed for the EU Floods Directive).¹⁸ Other examples of long term goals were found in the **Polish** case including the goal to increase the rate of youth volunteers.¹⁹

Effectiveness:

A key difference between the two main cases is the adherence to the rule of law. In the French case, there is an understanding that rules and regulations will be adhered to by public authorities; however, at the same time the need was also expressed for greater flexibility in the implementation of these regulations. This need for flexibility was also found in the Romanian case (stated by both local and county level key informants) in terms of the necessity of adapting the implementation of regulations to local specificity. This was reiterated in the French case, with attention paid specifically also to the physical specificity of the territory that must be managed using these regulations.

¹⁶ See Transcript P-4 Crisis Management Department, Sucha Beskidzka

¹⁷ See Transcript I-16 Private Planning Firm Architect

¹⁸ See Transcript I-13 Regional Soil Defense FVG Trieste

¹⁹ See Transcript P-20 Director Caritas Krakow

Effectiveness	
Nehoiu catchment (RO)	Barcelonette catchment (FR)
<ul style="list-style-type: none"> • Flexibility in emergency management operations and planning at local level (to learn from past experience) • Need for greater flexibility in implementing county requirements at local level (adapt to local specificity) • Issues for preparedness with lack of education, training (especially local level), and corruption issues • Major issue in lack of adherence to rule of law 	<ul style="list-style-type: none"> • General understanding authorities adhere to rule of law • EWS generally work well, but limited by lead time and could improve through intercommunal efforts • Need for greater flexibility in implementing national requirements at local level (adapt to local specificity, especially territory)

Table 12.5: Comparison for Effectiveness

In both the **Polish** and also the French cases, the effectiveness of EWS was stated as limited by the relatively short lead time authorities have to prepare for an impending disaster. This was particularly the case for the municipality of Andrychów in Poland, as they are upstream of the municipality of Wieprz and can at least warn Wieprz and give them a little more time to react. In the **Italian** case, emergency planning was stated as flexible in order to better complement the (more strict) territorial planning. Emergency plans were stated as needing to maintain a general flexibility to change when the territory changes. In both the **Italian** and the French cases evidence of strictness, which is seen as potentially connected to adherence to the rule of law, was found for particular regulations, especially for risk zonation.²⁰ However, in the **Polish** case this was implied but not directly stated by some community members and local authorities.²¹

Efficiency:

For efficiency in general there was a positive perception of the timeframe in which actions are taken, especially for emergency response. However, in the case of Romania there was a special issue with the fact that the closest fire brigade services are 20 minutes away from the town of Nehoiu. In the Romanian case, although there are efforts to minimize “red tape” for emergency management (perceived as a good example of efficiency by county level authorities), there is a general difficulty found in discussing efficiency due to a predominant discussion on lack of resources and how this adversely effects nearly all activity at all levels. Issues in efficiency were also seen in the French case, although this was more related to the lack of organization amongst communes at the local level. In the French case, efficiency was perceived by some emergency management actors as aided by the decision-making

²⁰ See Transcript I-12 Regional Civil Protection

²¹ See Transcript P-11 Head of Housewives Organization Lachowice and Village Head Lachowice; Transcript P-1 Wieprz municipality Mayor

hierarchy (helping to avoid duplication of work) between vertical levels, but the lack of efficiency in organization at the common (horizontal) communal level proved to be an issue. This is in large part the reason why efforts to improve this issue have been underway with development of greater intercommunal organization (e.g. the CCVU and the Syndicat).

Efficiency	
Nehoiu catchment (RO)	Barcelonette catchment (FR)
<ul style="list-style-type: none"> ● Efforts to minimize “red tape” (emergency management) ● General positive timeframe of actions ● Actions taken at most appropriate level (local level issue of inaction) ● Issue of poor parameters in construction of public infrastructure ● Specific issue: 20min distance of fire brigade to Nehoiu ● Generally, difficult to get to topic of efficiency without discussing issue of lack of resources 	<ul style="list-style-type: none"> ● Timing and reaction good (close proximity to Sub-Prefect) ● Decision-making hierarchy helps avoid duplication of work and extra costs ● Movement toward more intercommunal organization of activities ● Pooling of resources needed to realize, e.g. flood mitigation, projects ● PPRN good instrument, but perhaps not necessary for small areas (expensive and complicated)

Table 12.6: Comparison for Efficiency

These issues are in contrast to, for example, the **Polish** case in which the municipalities within the catchment area tend to have the basic resources needed including equipment and have not experienced the same problems in the lack of efficiency in sharing resources as has been found in the French case. The **Italian** case also proved different than the main cases, and similarly to the Polish case did not experience the same problems as the French and Romanian cases. The **Italian** case also tended to have adequate basic equipment at the local level (efficiency not inhibited by resources as seen in the Romanian case) and at least in the case of emergency management benefits from a very strong central actor, the regional civil protection, for organization of emergency response. Timeliness **across cases** was not stated as an issue with the exception of the aforementioned specific issue in the Romanian case. In the **Polish** case, a good example was found in regular drills occurring approximately every three years conducted for the purpose of improving reaction time, (they have been able to shorten this through trainings), and checking and updating all contact information.²²

Equity:

A **common thread** with respect to equity was the issue of isolated areas (all cases). This was reiterated in both of the main cases to be a problem for hamlets and small villages that are relatively isolated in terms of connecting infrastructure and are located higher

²² See Transcript P-17 County Police Office in Sucha Beskidzka (Prevention and Traffic and Crisis Management)

up the catchment areas. This proved also true in the **Italian** case and was also stated as a serious issue in some of the recent events (e.g. the centennial 2003 event that affected and isolated many smaller hamlets).²³ This problem is well acknowledged and is stated as attributed to both difficult geographies (the physical characteristics of the locations of the isolated areas) and the lack of accessibility and, occasionally also, poor transportation infrastructure to these areas.

Equity	
Nehoiu catchment (RO)	Barcelonette catchment (FR)
<ul style="list-style-type: none"> ● Good relocation example after 2005 events ● Improvements from previous favoritism in decision-making ● Social welfare programs (good but with caveats) ● Issues with isolated areas (disadvantaged geography, lack of investment in connecting infrastructure) ● Vulnerability stressed as function of location (inability to relocate, improper permitting in hazard-prone areas) 	<ul style="list-style-type: none"> ● Solutions for vulnerable groups (expropriation, advisory and social assistance) ● Good examples of solidarity (e.g. from past events) but depends on event and number of affected communes ● Improving knowledge of deconcentrated elderly population ● General feeling rural, more isolated, mountainous areas not supported by state ● Efforts to reach isolated areas (though still issue) ● New inhabitants at disadvantage in risk knowledge and connection to local network <p>*Though not an issue: vulnerability as spatial function well understood and communicated</p>

Table 12.7: Comparison for Equity

The French case also had a unique characteristic from that of the other cases with respect to a large and scattered elderly population. This was recognized as a serious issue for evacuation purposes and efforts were employed to attempt to identify the locations of these persons. This (although not specific to a large and scattered elderly population), is also an issue addressed in the **Polish** case at both the municipalities and the county levels which maintain an inventory of people who live in “vulnerable” places and contact information (including addresses) for these people.²⁴ In the Romanian case, local knowledge from village leaders helps supply this information, although no formal inventory was found during the field site visits.²⁵

In **all cases** (and from a wide range of key informants), an important common point can be made about vulnerability and how this is perceived and stressed as a function of location

²³ See Transcript I-1 Mayor Malborghetto-Valbruna; Transcript I-4 Community Leader (historian)

²⁴ Observations and information from preliminary visit to county crisis management centers as well as Wieprz municipality.

²⁵ Preliminary field visit discussions, particularly with local village representative (also acting as local environmental inspector)

more so than any other characteristic and refers to the physical location in which people live as opposed to other factors such as income and physical resources, although age was a reiterated but not as strongly stressed factor. In both the **Italian** and the **Polish** cases, past events also demonstrated strong, positive examples of solidarity in the case of major events including the 2003 centennial flood in the Italian case, and the Lachowice landslide in 2001 in the Polish case.²⁶

Trust:

For Trust, there was a general tendency in **all cases** that a good level of trust is perceived between the public and local level authorities, and is more strongly positive than the relationship between the public and higher level authorities.²⁷ In both of the main cases, there are specific authorities who are trusted more highly than most others and are not part of the local administration. These included the RTM (involved in forestry and mountain terrain management) in the French case, and ISU Buzău (the emergency situation inspectorate in Buzău) in the Romanian case. Reasons given for this especially high level of trust include the high level of confidence in the technical skill and knowledge possessed by these authorities and the crucial role they play in the overall assessment and management of risks. A relatively high level of confidence in emergency management (especially response) authorities was also apparent in **all cases**.²⁸

Trust	
Nehoiu catchment (RO)	Barcelonette catchment (FR)
<ul style="list-style-type: none"> ● Good level of trust between local authorities and public (generally stronger than higher) ● Good examples of trust amongst selected county level authorities ● Trust improving amongst all (up to national) levels ● Serious issues with corruption in assessment and cronyism ● Issues between local and county level authorities (specific to local level self-initiative) 	<ul style="list-style-type: none"> ● Good level of trust between local authorities and public (generally stronger than higher) ● Good examples of trust between public and higher level authorities ● General confidence between authorities (vertical and horizontal directions), but mixed examples with consulting firms

Table 12.8: Comparison for Trust

A unique point for trust was also found in the Romanian case. This amounted to the perception that trust (referred to as the confidence and ability to rely on other authorities) has been improving overall. This was stated as an improvement from previous deficits in

²⁶ Observations and information from preliminary visit and guided visit of previously effected areas in both cases.

²⁷ See also nice description in Transcript P-13 Municipal Technician and Volunteer Fire Brigade, and Civil Defense Wieprz

²⁸ See also Transcript P-1 Wieprz municipality Mayor, and Transcript I-20 Fire Department Udine

trust amongst authorities during communist rule, although there is still some improvement needed. One other unique, and perceived to be serious issue according to county level authorities and key informants in the Romanian case, is the issue of lack of self-initiative on the part of the local level, especially in the case of an emergency. There are a number of reasons stated for this. On the side of the local authorities, the assumption (as stated by local authorities) is that they are volunteers and ISU are professionals; therefore, the volunteers intervene until the professionals arrive. Another reason given by the local level is that they have inadequate resources to deal with most events and must therefore rely on county level authorities (especially the emergency situation inspectorate). On the side of the county level authorities, the argumentation follows that there are inadequate resources at all levels and that, furthermore, the local level has a tendency to immediately request assistance without first attempting to solve problems themselves.

In the **Polish** cases there were some examples of previous favoritism, specifically in development allowed according to geologic studies that should not have originally allowed this development; however, now the location and information about landslides is more transparent with the creation of the landslide inventory that is open to public.²⁹ In both the **Italian** and the French cases there appeared to be evidence of a higher level of trust amongst those who are (often technicians) for various agencies as these individuals regularly work together and know each other well, which is in contrast to heads of agency departments.³⁰

Resources:

Improvements in the access and creation of informational inventories were found in all cases. For example, in the **Polish** case there is now a new landslide inventory;³¹ in the Romanian case a landslide inventory is also in the process of being built between scientific and emergency management partnerships; in the French case there are examples from inventories of events and mitigation efforts from the RTM as well as new platforms for the PACA region; and in the **Italian** case there are inventories of information for emergency management built and coordinated by the regional civil protection.³²

Resource needs (in terms of lack of certain resources) were expressed by key informants in both of the main cases, although the Romanian case appeared to be much more acutely affected by overall lack of resources. This issue was reiterated across a wide range (nearly all) key informants as a limiting factor for capacities at local and county levels for as-

²⁹ See Transcript P-22 Institute of Urban Development (IRM)

³⁰ See Transcript I-21 Forestry Services and Transcript F-1 Geologist (BGRM)

³¹ See Transcript P-19 Polish Geological Institute

³² See Transcript I-12 Regional Civil Protection

assessment, management, as well as communication of risks. A good example was found in the Romanian case with personal liability insurance provided to emergency management committee members (who are mostly volunteers) through the municipality. This appeared, in contrast, to be an issue in the **Italian** case in which local level emergency volunteers must take out their own personal liability insurance.³³

Resources	
Nehoiu catchment (RO)	Barcelonnette catchment (FR)
<ul style="list-style-type: none"> ● Strong local knowledge as key resource ● Good practice creation of Pătărlagele research station ● Personal liability insurance for emergency committee members (commune level) ● Developments of landslide hazard inventory ● Efforts underway to enhance alert resources (SMS) ● Required insurance improves reducing financial burden of county and local level ● Some existing resources (evacuation plans, refurbishing fire hydrant system) ● Lack of resources is seen as a substantial and occasionally debilitating factor and capacity inhibitor (e.g. funding for maps, updating equipment, fixing infrastructure problems, personnel for many institutions, technical platforms for exchange of information and inventories) 	<ul style="list-style-type: none"> ● Good examples of interoperability of resources with software (e.g. DDT) ● Good examples of inventories ● Some resource needs (personnel for specific actors, funding for local projects), but not debilitating ● Back-up asset examples exist (e.g. individual insurance, reimbursement mechanisms for communes through state) ● Lack of PPRNs can be problematic ● Issues with affordability of information and studies for small communes ● Critique PLU not specific enough to improve issues of shared equipment across communes

Table 12.9: Comparison for Resources

Local knowledge was seen as an important informational resource in **all cases**, but was most used and relied upon in the Romanian case. For the French case, issues were also present with lack of financial resources at the level of individual communes and how this deficit can inhibit the ability to complete studies for risk assessment. This issue, along with the need to improve the organization of shared resources across communes, is being addressed through enhancing intercommunal efforts. In the Polish case, there are adequate resources to handle and recover from local events (extreme past cases in 2005 and 2010 in which state intervention needed for flooding), although much like the French case there is not enough financial resources to expropriate (purchase) all risky lands from people living in these areas. Local authorities in the Polish case have some resources such as equipment, enough information, and a special crew (which they are not required to have), but in general do not have much funds for reimbursing individual damages after an event.³⁴ As a general observation from the researcher, in **all cases** there appears to be a desire to have

³³ See Transcript I-5 Fire Brigade Volunteer Valbruna

³⁴ See Transcript P-1 Wieprz municipality Mayor

all risk information available and accessible to authorities (not necessarily to the general public) and in one place.

Coordination:

Generally, positive perceptions were found for both main cases in the required activities and exchanges between different vertical and common (horizontal) levels. The exception to this general perception is in the aforementioned issue of inaction at the local level in the case of emergency within the Romanian case study. In both main cases there was also an issue in terms of availability of funding to complete legally required tasks at the most local level (in the French case) and at both county and local levels (in the Romanian case).

Coordination	
Nehoiu catchment (RO)	Barcelonette catchment (FR)
<ul style="list-style-type: none"> • Positive examples in transfer of information between levels • Positive experiences for coordination within same horizontal levels • Negative examples with issue of inaction of local level (similarly found in Efficiency category), connected to lack of resources • Lack of ability to fulfil tasks at county and local level (due to lack of resources) 	<ul style="list-style-type: none"> • Good examples in harmonization efforts between vertical and within same horizontal levels • Good example of planning firms as neutral party for project proposal presentations to the public • Funding needed to complete mandatory tasks at commune needed • Issues with problem of proximity • Issues in coordination for sharing of equipment across communes

Table 12.10: Comparison for Coordination

The issue of the “problem of proximity”, referring to the spatial closeness of those authorities in charge of local risk governance to the affected public and the potentially negative consequences this can produce, was also an issue within the Romanian case (although was not as explicitly mentioned as strongly as an issue compared to the French case). This issue was also found in the evidence from the **Polish** case and is explained in greater detail later in this chapter under 12.2.2 Specific (key) issues.³⁵ Within the **Polish** case there were also examples of a general positive perception of coordination in-practice, especially in reflection of past events at the local level.³⁶ However, there are also new challenges for coordination concerning what efforts should be made in using (and also in a legal sense implementing) the information from the new landslide inventory, especially for planning.³⁷

Cooperation:

For cooperation, this in the Romanian case was automatically connected to communication

³⁵ See Transcript P-10 Regional Environmental Protection Agency; Transcript P-2 Institute of Urban Development (IRM)

³⁶ See Transcript P-11 Head of Housewives Organization Lachowice and Village Head Lachowice

³⁷ See Transcript P-22 Institute of Urban Development (IRM)

and how good the level of communication is between authorities. This was considered to be a direct measure of “good” cooperation. Cooperation in the form of informal information exchanges appeared to be positively perceived in both of the main cases at different levels and across sectors. However, a few issues that are currently being improved were found including a need for more training (in the Romanian case), and a need for potentially more interaction with the public (in the French case, although current perceptions view the attitude towards these interactions as positive).

Cooperation	
Nehoiu catchment (RO)	Barcelonette catchment (FR)
<ul style="list-style-type: none"> • Good communication between vertical and within horizontal levels • Perception generally positive for cooperation across sectors • Some good examples of volunteering and training, but more improvement needed • Cooperative connection between population and authorities strong with local level, weaker with county level 	<ul style="list-style-type: none"> • Good examples of informal information exchanges (many) • Some positive cooperation examples with crisis tasks and département level meetings • Lack of cooperation and problems at local political level, increasing intercommunal efforts help to improve this • Positive attitude with interactions with the public (flexibility pursued for needs of public), though potential need for more interaction

Table 12.11: Comparison for Cooperation

In the French case, the recurring theme of enhancing intercommunal efforts is also deemed important for informal tasks and exchanges and in remedying organizational deficits in addition to its importance for legally required tasks. This “intercommunal level” in the French case draws similarities to the scale of the mountain consortium in the **Italian** case and suggestions from private planners that this scale would be more appropriate for cooperation with respect to territorial planning.³⁸ Activities for building cooperation in the **Polish** site, such as the regularly occurring drills amongst all local level emergency management and administrative authorities, but also chain of command reviews at higher levels were perceived as a good practice examples.³⁹

Risk Culture:

A number of good examples in terms of educational campaigns were found in both of the main cases. However, there is still a general need for increasing education and awareness communicated in the Romanian case and must be comprised of efforts that also complement current community issues. This is seen as especially important as there is a relatively low priority given to risks compared to other more pressing issues (such as unemployment). The priority and consideration of risks and hazards was also found to be relatively low

³⁸ See Transcript I-10 Private Planning Firm Architect

³⁹ See Transcript P-21 Polish Red Cross Krakow

for the French case in comparison with other issues. Although in both of the main cases issues appeared with respect to the “focus on prevention” (or lack thereof), the nature of the issues were relatively different.

Risk Culture	
Nehoiu catchment (RO)	Barcelonette catchment (FR)
<ul style="list-style-type: none"> Some good examples of informational campaigns toward improving capacity (while respecting livelihoods – a necessity) Population seen as divided into two groups: self-recovery (e.g. those who have insurance) vs. no self-recovery (connected also to local level inaction issue previously mentioned) General need for increasing education to improve awareness (complementing current community issues) Barriers in focus on prevention (low priority of this and risks in general) 	<ul style="list-style-type: none"> Examples of self-initiated actions (e.g. insurance) Many good examples supporting awareness and education Intercommunal efforts help build holistic (Ubaye Valley level) understanding of risks in the area Information available, but self-initiative not guaranteed Very mixed views on whether the public is aware (though strong connection made to place), though lack of awareness for newcomers and tourists Wide range of perceptions on whether strategies focus on prevention Problems but also benefits with the “big umbrella”/“principal of precaution” interpreted as too restrictive Interests consider risk and hazard generally not in top priorities Uncertainty in where to find individual protection information Prevention considered “invisible” (need courage to do this) “Problem of proximity”, highlights attention to local needs but potentially negative consequences

Table 12.12: Comparison for Risk Culture

Within the Romanian case, a focus on prevention is stated as important and desired by a range of key informants. However, the ability to have such a focus is stated as inhibited due to more pressing short term priorities and the lack of resources to invest in prevention activities. In the French case, one issue mentioned was the invisibility, and therefore unattractiveness, of prevention activities as these are not seen by the public. This notion of invisibility was also reiterated in the **Italian** case with respect to the invisibility of non-structural prevention measures⁴⁰ and a generally greater emergency management focus.⁴¹ However, similarly to the Romanian case, this was still voiced as an important pursuit even though there is generally not enough funding to pursue prevention.⁴² The

⁴⁰ See Transcript I-22 Geologist Univ. Trieste

⁴¹ See Transcript I-21 Forestry Services

⁴² See Transcript I-16 Private Planning Firm Architect

French case, interestingly, has a unique issue with the topic of prevention as it relates to the “principle of precaution”, which has been commonly coined as the “big umbrella”. The issues presented here indicate that there can be benefits but also problems with having too much prevention and how this can create unnecessary restrictions and the avoidance of responsibility on the part of various authorities (e.g. to not permit certain activities to avoid liability).

With respect to the perception of public awareness, this **in general** followed the exact same pattern as the perception of availability of information to the public presented in the openness & transparency category (community members mixed, scientific and assessment focused informants feel lack of awareness, while administrative authorities tend to communicate the existence of adequate awareness). Awareness was also seen as tied to the connection of people and place (they know the territory they live in). This last point is elaborated in greater detail in a later section of this chapter. This category is also discussed in its own section due to the exploratory nature of the category and the individual research question it addresses.

12.2 Actors & regulatory frameworks: observations and specific issues

In comparing social context characteristics, a number of observations were made for actors and the institutional structures in which they operate that were specific to the scope of these actors’ responsibilities. These observations are provided in the first sub-section and contribute to evidence for both **RQ2** (regarding actors) and **RQ3** (regarding regulatory frameworks and structures in which they operate). The next section, then describes specific issues that were not specific to one particular scope of responsibility (e.g. emergency management, planning and sectoral, or administrative focused), but directly affect multiple actors and highlighted emerging themes from the comparison that have direct impact on the myriad of actors and the complex decision-making processes within risk governance. These themes also provide potential avenues for further research.

12.2.1 Observations for actors and institutional structures

Several observations were made from both the preliminary and primary fieldwork with respect to the different actors’ organization. These observations are summarized and provided within this section according to the macro actor types. For actors primarily involved in emergency management (which included entities primarily responsible for emergency response and recovery, specifically fire departments, civil protection, police departments, and other rescue services as well as NGOs providing emergency aid) observations included:

- Examples of **emergency volunteer structures** exist in all cases; however, there are some specific differences with what this means in terms of involvement and degree of involvement of the public. One of the strongest examples is found in the Fella River case study in Italy. In this case, several key informants reiterated that approximately 10% of the population serves as an emergency volunteer and that the population is well connected and has a high level of participation in emergency management activities. Citizens, therefore, already have strong a participative link. Discussions about greater participation from citizens emphasized this point, which appears to be in contrast to discussions in other cases. The issue of insurance for emergency management volunteers was also a point made in two cases. Within the Romanian case insurance was provided to the town hall for emergency volunteers and this appeared to not be a problem; however, within the Italian case lack of insurance provided by the state appeared to be an issue.
- The **role and structure of civil protection** was another point to note in several observations. Some commonality exists between the Romanian and the Italian case study in that civil protection and fire services are connected, at the local level in Italy, and at the regional (or county) level in Romania. However, the specific role that civil protection plays is not the same in each case. A very stark contrast can be drawn between the role of civil protection in the Italian case versus the role this entity plays in the French case. With respect to the French case, civil protection in domestic issues and emergencies plays a far more minor role and acts as a support especially for fire department and rescue services. In contrast, the role of civil protection (at the regional level) in Italy is far stronger and is perceived to be the most important entity in practice for emergency management (although there are some perspectives from the local level that this entity occasionally goes beyond what it should in expressing power and implementing actions and decision-making).
- The **concentration of resources for emergency managers** appear to be another important point. Across all cases the regional (or county) levels maintains a similar type of emergency management structure; however, the resources available in the Romanian case appeared to be primarily concentrated at the county level, with extremely limited resources at the local level in comparison with other cases. The concentration of these resources also proved to influence a contrast in the level of dependence and overall burden taken up by the county level in this case relative to other cases.
- **Structures for local level committees for emergency management** as well as crisis management teams and operative centers tended to be very similar across cases. One minor contrast was found in the Polish case, in which a crisis management

team is not officially required at the municipal level but indeed exists within the municipalities of Wieprz, Andrychów, and Stryszawa.

In terms of actors whose primary focus is in planning and sectoral management (including geological surveys, environmental protection agencies, water authorities, meteorological services, urban planners, as well as scientists) observations were as follows:

- In all cases, the **outsourcing of risk assessment resources** is a standard practice and necessary at the local level as often municipal offices do not possess the technical skills to conduct the kinds of hazard and risk assessments needed. In the case that inadequate funding inhibits the ability to outsource to consultant firms or private planning practices, reliance is placed on the use of local knowledge. The strongest example of this particular reliance was found in the Romanian case.
- On a similar note, **access to risk information and inventories** was an important point. In some cases, such as in Romania and Poland, efforts are underway to create inventories for mass movements (often triggered or reactivated by certain precipitation thresholds). This is being conducted, for example, in the Romanian case with the Institute of geography for mass movements in the area, and has been completed at the national scale for flood risk and hazard through a partnership with the Romanian Waters National Administration and the company BLOM. In the Polish case, this includes a mass movements inventory conducted by the Polish Geological Institute. In other cases, such as in the French case, inventories of risk and hazard related information exist and efforts are being made to make this information more publicly available.
- The **importance and role of forestry agencies** across cases proved to be a current and historically relevant point. In the Polish case forestry management is considered to be highly regulated and very strict. In the French, Italian, and Romanian cases, the influence of the role of these agencies is seen in the massive reforestation projects that have historically taken place in these case study catchment areas. Although reforestation efforts in some cases, such as the French case, are not currently as critical as they were in the past and reforestation efforts have slowed, in the Romanian case, forestry agencies face great difficulty in trying to balance reforestation with the pace of logging and timber production.

Actors primarily responsible for administrative duties (including entities such as municipal and regional governmental authorities) were found to have the following observations:

- Although this depends upon the spatial extent of a given extreme event, in all cases it was well understood that the mayor is the **primary decision-maker at the local**

level. However, key informants in municipal offices including the mayors themselves were very open in discussing the fact that, in practice, often decision-making powers are delegated during an event to municipal technicians for emergency management.

- With respect to **coordination and cooperation between levels** in both the French and Romanian cases, there are efforts underway to improve coordination and cooperation at the local level among the different municipalities and communes. In the French case this can be seen in the efforts of the community of communes (CCVU) and the mandates of the Syndicat. In the Romanian case this can be seen with the recent development of agricultural unions (GALs).
- The **general administrative structure** appears to be similar at all levels with respect to different administrative heads, councils, and boards. Across all cases, it was also very clear that the population (per perception of community leaders as population proxy) tends to have more confidence in local administrative structures than in these structures at regional (or county) levels. However, there are some exceptions to this general tendency with specific actors (e.g. ISU Buzău in the Romanian case).
- Similar to the previous point, the divisions of power in terms of the **degree of decentralization** versus centralized administrative structures tends to vary by case. All cases have legally defined specific powers and laws of decentralization, delegating decision-making abilities and resources to lower levels. However, the degree of decentralization seems to be strongest in the Polish case; while, upon observations of the researcher, the French case appears to be far more centralized in general. The Italian case appears highly centralized with respect to emergency management and civil protection.

12.2.2 Specific (key) issues

The first issue, and key theme, is termed by this research as “**The Problem of Proximity**” and refers to the potential negative consequences that derive from the closeness of local decision-makers to the general population. This can be considered a spatial concept and is related to the cooperative dynamics of various actors at the local level. It is an issue that is especially pertinent for small communities, characterized by an “everyone knows everyone else” situation. This characteristic is one that fits well to each of the case study sites presented. This familiarity places pressure on local decision-makers to grant, for example, building permissions in instances in which these permission should normally not be given. This equates, furthermore, to potentially negative implications for the regulatory framework and upholding restrictions for building and permitting development in areas deemed hazardous or with potentially high risk. The issue is therefore also related

to effectiveness, and specifically the adherence to rule of law.

This closeness, however, is not without its benefits. A close spatial “proximity” can also encourage the integration and use of local knowledge, an often key resource in accurate and effective management of the terrain. Therein lies a paradox in which this issue provides both benefit and potential adverse consequences, such as the perpetuation of illegal building and the increase in risk elements and potential damage. Examples of the occurrence of this problem, and ways in which this is attempted to be addressed, can be found in some of the presented cases.

Within the French case, this close-knit dynamic of the local level and increasing pressure to develop relatively limited available space has been recognized. The role of the prefecture is meant to help combat this issue, as the Prefecture (Sub-Prefect) can override decisions made by municipal authorities and explicitly building permissions granted by the mayor. The Sub-Prefect also rotates regularly to help ensure they do not become too close to the population. Additionally, in the case that there is a PPRN which stipulates an area is prohibited from development due to natural risks, this (along with the supervisory role of the Sub-Prefect) can help relieve some burden in deciding to reject building permit requests. Efforts toward more territorial planning at the intercommunal level are also considered to assist this problem.

Examples from the Romanian and Polish cases reflect the same issue, but not the same level of oversight. In the Romanian case, this is considered to be connected to poverty and the inability of people to afford to live in places that are not affected by hazards. In this case, local level officials openly communicated how they would prefer to “turn a blind eye” and grant permissions, rather than have an inhabitant (and normally someone they know) be denied the ability to have a home or develop their land. Thus, for both the Romanian and French case study sites this issue can be seen as a function and product of a small local level with limited resources; whether those resources are the financial or general (un)availability of developable land. With respect to the Polish case, this problem is not so much communicated as a reflection on resources (or lack thereof), but on the general pressure from the local community and the difficulty in rejecting requests from community members with whom authorities are very well-connected. Pressure is then placed on the authorities to have very strong, well-founded arguments to reject requests. This is also important, just as in all the other cases, because of the legal liability the mayor retains should something happen such as the occurrence of an extreme event and damage be incurred on a permitted development. It was communicated within this case that mayors occasionally prefer to grant permissions at the local level because they know, similar to the French case, that the request will then be rejected at a higher administrative level. This may be

an arguably risky practice in itself, but does allow the mayor to save face in the community.

Another key issue can be described as “**Balancing Beauty vs. Danger**”. This is especially relevant for the French and Italian case study sites; both of which rely to a substantial extent on tourism as a main sector of the local economy. There is a paradox in that the mountains are an attractive place to live, that these areas provide a paradise and beautiful landscape (many new families come to live in the mountains in the French case for example); however, they are also places in which a myriad of hazards and potential risks are possible. This paradox places aesthetics at odds with protection and greatly influences the ranking of priorities of the local level. The dichotomy draws attention to local needs and livelihoods and the generally perceived disconnect between these and the issues of risk. Connection is also made to the issue of risk communication, and how much attention should be paid to the communication of risks relative to other issues in the community.

“**Key actor pressure points**” provides a simple description for the next key issue. Although there are many actors whose roles are vital to the performance and general function of risk governance processes, it became evident that in a number of the cases there were specific, single actors on which the whole system seemed to rely. This as a general observation from the researcher, can be described as key actors who represent important yet highly stressed parts of the (risk governance) system. They complete their tasks and fulfill their roles, but are stretched incredibly thin (especially with respect to inadequate resources) although their work is essential to the functioning of the entire system. These pressured “key nodes” that are already under stress could have substantial negative impacts to the core function of the system or could potentially greatly benefit the system should they be strengthened through financial or other resources means (this can also include greater autonomy in decision-making powers).

In the French case, this key actor is the RTM which operates at the local level and contributes essential risk assessment and management information to a wide variety of authorities as well as private firms. They are considered to be highly trusted and knowledgeable in all aspects of the local territory. However, at the local level there are only two technicians covering a vast terrain. Responsibilities of the actor previously included the creation of PPRNs. However, as a state service it was determined that they should not provide competition to private consulting firms in the creation of these plans. In consequence, this responsibility is now no longer one of their tasks which they are paid to complete. However, the RTM is still to a great extent unofficially consulted as it was prior to the shifting of these responsibilities. The issue remains to what extent this actor will continue to provide the same level of guidance on which many other actors depend. The actor to whom these responsibilities have been shifted, the DDT, described this dependency and how crucial

the RTM is in the chain of command, and remarked on how impressive it was that this authority can manage with only two technicians covering such a great area at the local level.

A very similar issue was found in the Romanian case with the county level emergency situation inspectorate (ISU Buzău). This authority tends to manage all aspects of response and recovery, but also works in prevention and preparation. They are described as very well trusted by a variety of informants and as one of the most important actors in disaster management. Although they are charged with and expected to perform a wide variety of tasks, there are also substantially limited resources with which to fulfill these tasks. It is, furthermore, widely perceived that the inspectorate is the only authority capable of fulfilling these tasks, placing further strain and heightened reliance on this actor.

A further similarity can be drawn with regional water basin authority in the Italian case study site. This authority is described as having very few people but is tasked with managing a very large territory. What is stated is that this particular authority could ideally increase its coordination role; however, they need more offices and especially offices at local levels, more technical as well as local experience, and support from people at the local level who possess the best knowledge of the terrain and its problems.

12.3 Risk culture: key factors and connecting points

This section provides insight into the understanding of what “risk culture” means according to information gathered from the perceptions of the key informants in the different case study sites; addressing what some of the potential factors are for this understanding (**RQ4**) and if and how they differ (**RQ4.a**). The research attempted to not ask questions directly about culture, culture of risk, or the term risk culture. However this was the topic brought up by informants during the course of the interviews, providing insight into the unsolicited but greatly appreciated evidence of how informants connect to factors of culture and to risk culture in general.

In the **French** case study, many aspects of culture were touched upon and aspects of risk culture tended to be a central topic, particularly for community leaders and local level key informants. Much of this appeared to be a combination of past major events, the connect- edness of people to place, and different levels of awareness based on the experience and history of this connection to place. Disaster memory in terms of especially education to preserve the knowledge and awareness of past disasters and their effects appeared to also be an important point and characteristic of the discussion related to risk culture. In inter- views with départemental territorial management authorities, “culture of risk” was directly implied as strongly connected to the promotion of risk prevention, and that sometimes risk

culture is not fast enough to keep up with what is needed for prevention and promotion of prevention in decision-making.

In the **Polish** case study site there was a commonly understood idiom that “the Pole learns from experience”. This stressed importance placed on learning and expanding from past events, not necessarily something currently encompassed by the risk culture indicators of the “good” risk governance analysis tool. This ties nicely to examples given by informants that (although not directly stated as connected to culture or culture of risks explicitly) past experiences with events in 2010 (major flooding throughout Poland), in 2006 (major flooding in the case study site municipalities) and in 2001 (the Lachowice landslide) have encouraged an awareness of the dangers of the territory and the need for improving management of risks.

The evidence from the **Italian** case study site also drew connection to disaster memory and appeared to have the potential dangers of the area in mind 10 years after the 2003 event. This has been encouraged by the decision to invest substantial time and effort in the creation of a documentary as well as extensive research conducted (within both social and physical science fields) about this event with local level stakeholders, including not only actors but also those with an interest and especially those who were affected by the event. There was also some connection made according to the Regional Soil Defense that the creation of assessment information for risks and hazards is a tradition and has become a part of the culture this area. It was further communicated that after the major earthquake in 1976, awareness and importance of risks and recognizing risks has become part of the culture of the people. From the municipal office of Malborghetto-Valbruna, connection was also made between the implementation of prevention measures and an overall perceived lack of a needed “culture of prevention”.

Informants from the **Romanian** case study site also made a connection between inhabitants and the physical place in which they and their ancestors have lived. Prevention is considered to be low with respect to other issues, and is not explicitly stated as part of a “risk culture” but is connected indirectly through the description of actions and attention (or lack thereof) to prevention focused activities compared to the main issues and priorities influencing decision-making at the local level. This has also been connected to the perception held by county level informants of a general lack of civic responsibility; connecting, although again indirectly, to the lack of actions taken with the planning and mitigation of risks at the local level.

In **all cases** presented, informants drew attention explicitly to the mountain as part of the identity of their community; often identifying themselves (as a community) as “people of

the mountain” or a “mountain population” and referring to the people who inhabit these areas as having a “mountain culture”. This latter point is connected by informants to the knowledge individuals possess of the terrain (if they are inhabitants who have lived in the area for generations, for example, they would be considered to have a strong mountain culture and therefore also to have an understanding of the mountain environment and its potential risks).

To summarize, a brief list of four main points highlighting risk culture related factors from the above are provided as follows:

- the ability to learn and adapt from past experiences
- the connection of people to place, and how important this is as an aspect of identity
- perpetuation of disaster memory, especially in the form of education or awareness building
- the importance of prevention and the promotion of prevention-related activities

The above points to some connections but also departures from the “good” risk governance analysis tool with respect to awareness (especially of the population and in respect to indicator 2). This seemed to be highly relevant, but should also be expanded within the tool to include the awareness of different levels of administrative authorities in addition to the population. Some connection to the relevance of the third indicator (regarding a focus on prevention) was also found. However, this can be explained in both positive and negative aspects. On the positive side, a focus on prevention was associated by a number of informants in all cases to be a desirable goal in general; while, on the more negative side, difficult to implement in practice especially in the Italian and Romanian cases. In the French case, in contrast to the other cases, risk culture (with respect to influences on risk decision-making) can also be negatively impacted by too much prevention, in which it can create a very restrictive lens through which decision-makers view development and general daily life and activities at the local level.

Self-initiated actions (referring to indicator 1) and the focus on livelihoods and local priorities and needs (indicators 4 and 5) were not as explicitly stated by the key informants themselves as being a part of the concept of “risk culture”. However, one can arguably derive this connection in the responses to questions regarding the importance of prevention and the importance and attention to risks and hazards relative to other issues in the communities at the local level.

12.4 Conclusion

The content presented attempted to focus on evidence provided by the key informants, and particularly their perceptions as to the functioning of various aspects of the risk governance system in which they operate. What can be concluded is that there are indeed commonalities but also differences amongst the cases for each “good” risk governance category. Throughout the description of the comparison for each category provided in the first section of this chapter, the perception of a wide variety of actors is presented with key differences and commonalities highlighted as appropriate and in accordance with the evidence base across both the main and satellite cases. The second section addresses observations of both actors and their institutional arrangements, identifying common points and differences by scope of actor responsibility, and then is followed by specific (key) issues revealed in the course of the fieldwork that maintain high relevance for the follow through and function of risk governance systems. The final section provides a reflection on the concept of “risk culture” as addressed by the key informants and how this also connects (or diverges) from how the analysis tool has interpreted this concept. The final section, furthermore, builds upon the overall understanding of in-practice examples used in the interpretation of relatively fluid concepts, such as the culture of risks. This provides an appropriate transition to the expansion of this understanding provided in the next chapter, which focuses on reflections and to the connections revealed in the primary empirical analysis work for the “good” risk governance categories.

Chapter 13

Reflections

This chapter provides reflections on the risk governance analysis tool, highlighting key points and understanding of the connectivity between different categories (or principles). These reflections comprise the bulk of the first two sections of this chapter. The first section delves into the process of using the analysis tool and what was learned from the creation and employment of this comparative analysis structure. The second section goes into detail identifying the general connections found amongst the different categories, selecting upon how these principles have been connected using in practice evidence from the key informants. This section is based on the results of the connection mapping completed for both of the main case study sites. The section, furthermore, contributes to both **Objective 1** *Characterization of what is “good” risk governance*; and **Objective 3** *Operationalization of risk governance through use of an indicator system to establish the basis of analyzing the empirical work in each study area*. The chapter then reflects on the conceptual underpinnings in terms of context and the spatial dimension as one of the main foci of the thesis. This focus is then transitioned to a reflection on the overall research approach found in the last section of this chapter.

13.1 “Good” risk governance analysis tool: what worked well, what did not

In reflecting upon the overall use of the analysis tool, a few key points can be made as to what worked well, what did not, as well as some surprises. One of these key points can be found in the representation of different key informant types and how this influenced the data collected. Despite achieving representational goals in the interviews conducted with key informants, there is still the possibility for potential bias with respect to which actors provided more information than others. For example, in the French case there were many key informants who were strongly connected to the community and many of whom who spoke at length regarding culture and aspects of culture. Although this does not and

should not negate the importance of culture and aspects of culture described in this case study, this contributes to the substantial amount of evidence provided in connection to the “good” risk governance category “Risk Culture”, as opposed to the amount of evidence provided for other categories.

Another point is found in the understandability of some categories relative to others. Some categories are very simple and much easier for key informants to directly address such as **Resources**. This trend was a basic observation throughout all four cases. This may be due to the fact, and is the observation of the researcher, that **Resources** tends to be a very tangible category in comparison to other categories such as **Trust**. Investigating perceptions of **Trust**, for example, is not as easy a process, as the researcher must be cautious and avoid potentially assigning blame to either the informant being interviewed or to other actors or stakeholders. These points might also help the reader to understand potential influence from looking at the category mapping. One can see that for both cases **Resources** is a fairly well addressed and well connected category relevant to others.

A related point was realized analyzing the collected data that the indicators in many cases were partially addressed by evidence, and in some cases were not addressed at all. This can be seen for example in chapters 10 and 11 when category summary tables indicate “insufficient evidence to identify patterns or make key point conclusions” for a particular indicator. There are a number of reasons for this outcome. Firstly, the questions asked to the interviewees were not comprised of an individual question for each indicator. This would have required at least 60 questions to be asked to each interviewee, which was perceived by the researcher to not be feasible within the time and resources available to both researcher and interviewee. Consequently there was no guarantee that evidence was provided for each indicator. However, perhaps surprisingly, evidence was indeed found for the far majority of indicators in both of the main cases. The second reason can be found in the scope and overall complexity of what the indicators try to encompass. Although the indicators provide insight into what kind of aspects of “good” risk governance principles can be found at the EU policy level, the indicators and their use demonstrate the complexity and difficulty in attempting to establish a holistic understanding of the topic at hand.

There is, however, a benefit in realizing and especially in visualizing this complexity and communicating this as a product of both policy and in-practice evidence. Regardless of difficulties managing the expanse of what the analysis tool considers (a substantial amount of highly qualitative data from four different spatial contexts filtered through nearly 60 indicators), the tool still enabled a basis for comparison and for understanding how different parts of the complex system of “good” risk governance are connected.

13.2 Connecting “good” risk governance principles

To say that everything is connected to everything is a simple statement (and potentially true) with respect to the use of “good” governance principles within the analysis of risk governance processes. However, understanding **how** everything is connected is deemed by the research to be a truer form of knowledge. This is why this subsection identifies overlaps and connections amongst and within categories of the “good” risk governance analysis tool. The “amongst” categories refers to the individual indicators for each category, which in some cases proved to be strongly connected to (or overlapping) each other based on examples from in-practice evidence. These connections are supported through the “connection mapping” conducted for the main case study sites (see Chapters 10 and 11). The second part of this subsection addresses what issues were found but not already contained within the current category and indicator system. Both of these parts assist in enhancing the understanding of how the different categories (or principles) of “good” risk governance are related and what key, in-practice issues create these connections. These parts, especially the content concerning what is not currently addressed by the analysis tool, furthermore help in determining some potential points for improving this tool for future use.

Connections and overlaps amongst the categories

The next series of paragraphs provide examples of some of the strongest connections revealed amongst the different “good” risk governance categories and between their various indicators. However, this should not be interpreted as a complete and exhaustive description of all possible connections.

With respect to **Openness & Transparency**, a strong connection in general was made to **Resources** in terms of the information available and particularly to in practice examples of existing inventories and platforms and the accessibility of these resources to different groups. This also explains the differences and mapping between the two main case study sites. In the situation such as that represented by the French case, multiple sources of information exist and (with respect to inventories) are supported by regional level authorities as well as institutions for higher research. In the Romanian case, the connection is not drawn (due to lack of resources) but the relationship is well understood that informational resources and their accessibility are strongly connected to promoting openness & transparency.

For **Accountability** evidence from the Romanian case highlighted the connection between Indicators 2 (related to clarity of responsibilities) and 5 (regarding maintenance for structural mitigation measures). The connecting point lies in whether or not the specific

responsibility for the maintenance, repair, and overall upkeep of mitigation measures is clearly assigned to a specific actor. This appeared to be an issue in the Romanian case with the fact that maintenance only occurs at a few select points, and was also seen as an issue in the Italian case with who is responsible for the removal of debris and general maintenance of massive structural mitigation measures installed after the 2003 event. Another example from the Romanian case was found with a lack of clarity of who is responsible for maintaining the valley and clearing away rubbish from the rivers. According to local authorities, this should be the responsibility of each household, but this typically is not taken care of and there are also conflicts in shared responsibility for this issue with the Romanian Waters Administration.

Participation appeared to draw a connection to **Resources** with respect to the use of local knowledge in decision-making in both of the main cases, reflecting the connectedness of Indicator 4 regarding use of local knowledge for bottom up input to other categories. Although this served as a key informational resource (connection to resources category), and was stated as used in order to replace a lack of other information, this connection was demonstrated in an extreme form in the Romanian case in which the local level and also the county level relies heavily on this knowledge in lieu of other available information.

In **Strategic Vision**, both Indicators 1 and 3 seem to be inhibited by a mutual deficit; namely, a lack of resources inhibiting capacity building and the ability to think long term. Evidence in terms of the connection between Indicator 1 (related to strategies that target local capacity strengthening) and the category of **Resources** was found in both of the main cases. However, in the French case solutions in efforts to pool resources at the intercommunal scale have been underway to resolve the problems associated with this connection.

Effectiveness was found to be connected to both **Coordination** and **Resources**, with deficits between one connection (such as resources and effectiveness) and mutually reinforcing deficits between another (such as effectiveness and coordination). This can be found for example when a lack of resources prevents the fulfillment of legally required tasks and adherence to the rule of law. This is also seen as a problem when local level authorities are not able to fulfill their mandates as directed by higher level authorities.

The category of **Efficiency** was inherently tied to the category of **Resources**. Although this should come as no surprise given the fact that the definition and indicators for this category directly relate to resources. Key connections using in-practice evidence were found especially for Indicator 2 (related to the pooling of resources for greater optimization) in the French case, and to Indicator 1 (in terms of the most appropriate level) for both of the

main cases.

Resources appeared (in both of the main cases) to demonstrate many strong (although in-practice often inhibiting) connections to a variety of other categories (some connections already covered above). In both of the main cases, the visualization of the connections mapping could be reconfigured with **Resources** as the central node for the Romanian case, and one of the main nodes for the French case. Some of the strongest connections held in common from the in-practice evidence in both of the main cases included:

- affordability of informational resources (Indicator 4) such as studies for risk assessment connected to **Openness & Transparency** (Indicator 1) in terms of availability of information; particularly for small communes and hamlets
- use of local knowledge to remedy lack of other informational resources and as an important resource in its own right (see previously mentioned connection to **Participation** in this section)
- although far more problematic in the Romanian case, the difference between legally required tasks and what happens in practice connects resources to **Coordination** and **Effectiveness** (see previous connection in effectiveness)

With regard to both **Coordination** and **Cooperation**, these were seen as difficult to separate and often were interchanged freely during the interviews. This implied both some confusion as to the difference between the two terms, alongside the common combination of the two terms together. However, a key difference appeared (as a general observation) to be the emphasis on exchange of information as more directly connected to cooperation and the management of emergency institutional structures as more related to coordination.

For **Risk Culture**, a number of connections were made amongst the indicators for this category. This was particularly found for the first three indicators: the first related to people being encouraged to be informed and to take self-initiated actions; the second related to a high level of awareness of the population; and the third related to a focus on prevention. Each appeared to influence and reinforce the other. Conversely, when one lacks, this tends to cause a potential deficit in another. Connections between the first and second existed in the example that citizens who are aware and live with risks are better able to know what individual actions they should take. The connection of Indicators 1 and 2 to Indicator 3 was found in that being well-informed and maintaining a high level of awareness helps perpetuate a focus on preventative and pre-disaster activities.

Within the same category of **Risk Culture**, connections are also drawn amongst Indicators 3, 4, and 5. The connection here lies in whether or not the focus on prevention (a

key part of Indicator 3) is connected and complementary to local level priorities and needs (the focus of Indicator 4), and supports the protection of local livelihoods and strengthens community level capacities (representing main components of Indicator 5).

Issues not addressed in the present tool

A number of issues were revealed in the course of analyzing the primary empirical data that were found to not be currently addressed with the category and indicator system. These issues expand the understanding that was established in the policy analysis used for generating the system and provide potential points of improvement that could be made for future revision and use of the analysis tool. These issues were primarily found in the **Openness & Transparency, Accountability, Trust, and Equity** categories.

For **Openness & Transparency**, aside from what is addressed by the indicators, there is an issue with respect to the fact that the definition also encompasses transparency of risk management practices themselves but there is not an indicator that explicitly addresses this. This could address more issues such as a lack of transparency in the bidding process for projects (e.g. infrastructure projects or plans). Evidence was found for this issue primarily from the Romanian case with the example that some bids are public and some are not. From a regulatory standpoint, this depends on the amount being paid for a project (e.g. such as a project commission for creating a risk or hazard map). If it is below a certain limit, this does not have to be public. However, it is clear that there is a strong perception from a variety of informants that this process is not conducted in an open manner.

Additionally within **Openness & Transparency**, there are indicators related to the understandability of information with respect to the public. However, there is also the case that information is not understandable between authorities or other actors. This issue could potentially be placed under **Coordination** (in terms of a holistic approach found in Indicator 5), or **Resources** (in terms of the exchangeability of resources in Indicator 2). One in-practice example found for this issue was in the Polish case with the creation of new information, such as the new landslide maps created by the Polish Geological Institute and the ability of other actors, such as urban planners, to be able to understand the legends and different descriptions of items in the map (e.g. lack of clarity with how a planner should interpret an area that is deemed as a “temporarily active” or potentially endangered area).

In the category of **Accountability**, part of the intent of the definition of this category includes how well responsibilities are distributed amongst different actors. This point, however, is not adequately and explicitly addressed within the given indicators and de-

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mands further revision. Another example is the accountability of the population in terms of if, for example, there is a review or monitoring of whether inhabitants adhere to specific requirements for their homes. An example of this can be found with the requirement in the French case, that the bottom floor of a home in this case study area cannot be a dwelling space, but must instead be reserved for usages like storage or parking. However, this issue could be connected to the category of **Effectiveness** with respect to the focus on general adherence to rule of law found in Indicator 5.

Another missing issue related to the population was found in **Trust**. This amounted to a lack of consideration for whether a good level of trust exists between different community members. This, though an important issue and one for which evidence was found, is not currently encompassed within the indicators. Examples, however, were found in both of the main cases with statements provided communicating that occasionally people will either not provide or will purposefully not disclose relevant risk information when they try to sell their home or property.

For **Equity**, an issue not explicitly currently covered in the indicators is whether some groups within the case study are more vulnerable than others. Information related to this issue was gathered in large part as a result of the way the questions were asked, and in how this was used as an understandable entry point to approach the investigation of what are potential “vulnerability” factors according to the key informants. The outcome of this originally unintentional line of questioning proved highly beneficial to the research approach as responses indicated the importance of spatial relevance and vulnerability as a function of location more than any other factor across cases (age proved to be another important factor, but still secondary to spatial distribution in terms of where people physically live). To highlight this point, one example found in the Romanian case was the reiteration by a number of interviewees that all persons at the local level are equally affected aside from their spatial distribution. The people in general all have similar problems and the most important differential factor in terms of their level of vulnerability is their spatial distribution.

13.3 Reflection on context and the spatial dimension within the risk governance system

A brief reflection is provided here regarding the spatial context and the importance of this as a foci for the research approach, particularly as it connects to the construction of the conceptual framework presented in Chapter 4. A strong connection can be made between both the insight gleaned from the results of the investigation presented in this thesis as well

as to the changing risk and spatial context components of the conceptual framework. This is especially pertinent for the conceptual borrowings from the “hazards of place model of vulnerability” from the work of Susan Cutter and colleagues (see discussion and connection to Cutter (1996); Cutter et al. (2003); Cutter and Finch (2008) in Chapters 3 and 4). From previous chapters and especially Chapter 8, one can see that there are a number of similarities with respect to physical context amongst the cases presented and in particular to the hydrological (or water-related) extremes that must be dealt with through the processes of the risk governance system. Similarities within the physical context are additionally related to issues of accessibility, and specifically isolation, of different settlements. From the case study chapters, and especially the cross-case analysis chapter, other more social context-related aspects were found in common within the gamut of the spatial dimension of changing risk. Both together reflect the aforementioned spatial distribution as a key factor for vulnerability, and the most influential factor as surmised from the key informant perspectives of in-practice strategies.

The importance of physical location as a prime factor for the difference in vulnerability between members of the population was surprisingly commonly reiterated in nearly every instance in which this question or even related questions were asked. A few observations can be drawn from this pattern. For one, the importance of place in terms of physical location, for example of one’s home and valuables, appeared to be one of the most readily acknowledgeable and recognizable factors for the key informants across cases. This may, as a further observation from researcher, be the result of both the more immediately tangible aspects informants tended to see in their understanding of vulnerability, and also appeared to be connected to the understanding from these informants of how people were differently affected in the community during past events. This, furthermore, reflects the use of local knowledge and past experience in consideration of factors influencing vulnerability. Discussions with informants on the topic of vulnerability support this assertion. Examples in these discussions were often given of where people affected by an event were located and especially their proximity to unstable slopes, river or torrent flow, and flood plain areas in all cases. Some discussion within the Romanian case also included the construction material of residential buildings and their potential fallibility; however, physical location remained the main focus and appeared to be a convergent point supporting the “spatial context” as an umbrella for the more readily recognized determinants of vulnerability.

The hydro-meteorological, or water-related, aspects also appeared to play a role in the understanding of the informants in terms of impacts that must be dealt with within a given space. The water-related extremes experienced in all cases provide a common background and both practically and conceptually serve as an influential aspect of the physical risk component within the changing physical inputs presented in conceptual framework.

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Examples of commonalities in perception across cases highlighting this influential aspect were found in discussions with the informants, especially local decision-makers as well as emergency managers and community leaders. In all cases, these examples were found in the communication of the following: a strong connection between different types of weather (and particularly extreme weather events) and evidence and perception that these weather events and even seasons have been changing over time; the fact that these weather events can be very localized and, for example, can affect one valley but not the next; and that there are human activities especially the location and design of various structures (such as bridges) that can exacerbate the negative impact of these events. In all cases, deforestation and the effects of vegetation on slope stabilization in the event of torrential rainfall was a point mentioned by multiple informants, although the degree to which this issue is still a substantial problem varied by case. The extremely rapid nature of these events, particularly torrential rainfall and flash flooding, was also well understood across all cases as a particularly limiting factor in the potential actions that could be taken and the lead time for warnings provided by EWS prior to an event.

Although it would appear from these key physical aspects that vulnerability can be interpreted as a largely spatial problem particularly with respect to physical location and the locality of events, other more social aspects can be mentioned reflecting connection to the social inputs part of the “changing risk in a social context” equation. This includes, for example: lack of attention and funding from higher level authorities; lack of financial resources for relocation on the part of local authorities; lack of interest and individual incentives for taking personal protection measures; lack of education especially for nonlocal inhabitants or visitors to the area; as well as a need for further education in understanding extreme phenomena that occur or have occurred in the area. The lack of attention from higher authorities (regional and national) was connected in multiple cases to the fact that the cases have difficult environments in which to build infrastructure and that there are small populations and generally low population density in these areas compared to more highly urbanized areas. This example also demonstrates the interwoven nature of the physical and social inputs by drawing attention to the combination of difficult geographies in all cases with lack of investment and in some cases unfavorable demographics. The concentration and distribution of resources also appeared to be a noteworthy issue further reflecting spatial relevance. This was seen as a key factor that can influence the effectiveness of local capacities to cope with events, and additionally played an important role in determining the most appropriate level in which decisions can (although not necessarily should) be made.

Another point was found in the need for the implementation of regulations (ranging from EU level Directives, to national mandates, and county or “regional” level requirements)

to be flexible enough to adapt to local conditions. This includes conditions such as the physical territory and also communicates the need for graduated goals (different levels of goals set over time and that can adapt over time) that are compatible with the resources of the local level and complementary to the needs of the local level to ensure acceptability and successful implementation. This last point especially reflects conclusions from the research and case examples presented in Mercer et al. (2012) and some of the challenges for risk governance presented in Gardner (2015). The need for flexibility also reflects the diversity of the issues found across the four cases. Even when “green” and “red” evidence in the perception of practice is found, the issues and main points contain similarities, but the causes and details of context can be different, requiring different approaches to find a solution. This can be seen, for example, in the lack of actions for active involvement of the population, reflecting the key principle of participation found in good governance and in the conceptualization of “good” risk governance in the analysis tool developed within this research. In all cases there is little evidence of active involvement of the general public. However, in the Italian case this is not seen as a serious problem because the local volunteer system is widespread even within these small communities. However, in the Romanian case the lack of involvement has been attributed by several informants to a low level of civic responsibility, although there are some efforts to promote inventories and exhibitions at the local level to enhance local knowledge (one-way communication). This is in contrast to the French and Polish cases, in which there are efforts to encourage a more active community through public exhibitions, forums, and lectures (French case) as well as through use of local and regional information systems (French and Polish cases). This, among other examples from the empirical work, can also influence potential future elaboration and development of the conceptual framework.

In general and after consideration of the empirical database, the basic structure of the conceptual framework is still held as relevant for all cases (and arguably beyond these cases) as the common core components and concepts remain applicable to a general understanding of risk governance as a system, its inputs, and what it works toward. However, this could be strengthened and expanded in the elaboration of how this functions in-practice for and amongst each component through examples from and across the cases study sites. Past events from the cases provide examples of how the risk governance system operates in practice throughout all phases of the disaster risk management cycle. Examples can be followed in terms of understanding the context (both physical and social), and the processes that occur before, during, and after an event that work toward securing and reducing the risk of extreme events at the local level. Conducting a specific tracing and visualization of these examples using the conceptual framework can help further understand how these different parts of the risk governance system flow together in practice, garnering a better understanding of how this as a “system” works. Core components including the social in-

puts, risk governance processes, and feedback mechanisms could be highlighted in future revisions of the conceptual framework figure to represent primary pathways for “good” risk governance characteristics and their influence. Further iterations of the conceptual framework based in tracing examples would highlight that the “good” risk governance concepts elaborated within this thesis assist in the identification of good examples of practice in which processes are carried out and perceived positively by local stakeholders. At the same time, they can also reveal deficits (or when in extreme cases in which practices are inhibited, “chokepoints”) providing negative examples of practice that hinder risk governance processes. Each part of the system could be expanded and illustrated using these examples, the elaboration of which is the topic of a pursuit of continued research beyond the presented findings in this thesis.

13.4 Reflection on the research approach

In retrospect, looking back at the research approach that was selected and employed, a number of comments can be made. First and foremost is the issue and importance placed in pursuing a highly qualitative structure of investigation. Although the researcher still deems the use of qualitative methods to establish understanding of great importance, substantial difficulty was found in the amount of time and especially labor-intensive nature of this kind of pursuit. The latter difficulty is also extremely pertinent with respect to understanding context, requiring also visitation and extensive travel in addition to the management and analysis of a significant body of qualitative empirical data. The research reflects that, in future research, greater attention be paid and substantially greater buffer given in the estimation of time required for gathering and analyzing data of this nature. The researcher would also suggest, if possible within the physical and financial limitations research at hand and supporting project, to have longer less intense field visits for data collection.

With respect to the pursuit of the overall **aim** of the research in terms of understanding “good” risk governance, *“to provide reflections and recommendations for strategies and practices that are commonly applicable as well as those elements that have to be tailor-made for the local context of each case study analyzed”*, the achievement of the objectives and supporting research questions was seen as a required series of steps.

In order to provide recommendations and to consider the recent state of policy, the characterization of what is “good” risk governance (the focus of **Objective 1**) was a necessary first step. This was developed and is featured in Chapter 7 through the extensive EU policy level analysis used to derive principles of “good” risk governance and to provide an analysis tool to be implemented in various cases. In investigating this highly policy

relevant topic, it was also important prior to this policy analysis to understand how one can consider risk governance as a system with various factors supporting or inhibiting processes and working toward a common output. This was also the reason for the conceptual framework developed in the initial phases of the research pursuit. The development of the conceptual framework also supported how the research approached the concept of spatial context and how this is connected to risk governance processes, supporting **Objective 2**. The utilization of the analysis tool is a product of the policy analysis process presented in Chapter 7 enabled the fulfillment of **Objective 3** providing the filter through which to analyze the substantial qualitative empirical data from the primary fieldwork.

Fulfillment of **Objective 3** also enabled the research to address and provide evidence for the main research question, and questions two through four. Using the analysis tool for the evidence base in different case study sites enable the ability to communicate, according to the perspectives of key informants as key actors within the spatial context, what were considered as issues, positive examples, and issues undergoing improvements with respect to practices on the ground. The use of the tool then filtered and enabled the understanding of this information in the context of “good” risk governance as understood from the policy analysis at the common EU level. The analysis using the tool for the individual cases and comparing across cases permitted the research to address the first research question and first sub-question (**RQ1 and RQ1.a**). The comparative component of the research presented in Chapter 12 helped identify some basic commonalities but also differences with respect to issues for both actors and the regulatory frameworks in which they operate addressing both **RQ2** and **RQ3** (although more indirectly with respect to the latter). The fourth research question (**RQ4**), which focused on risk culture and was seen as a more exploratory component of the research as compared to **RQ2** and **RQ3**, was explicitly addressed by its own “good” risk governance category. Factors pertaining to risk culture factors and commonalities with respect to this across cases were also presented in the comparative analysis and results provided in Chapter 12, addressing both **RQ4** and its sub-question **RQ4.a**.

The latter part of the **main aim** of the research (recommendations), as well as **RQ1.b** (best practice examples) and **RQ5** and **Objective 4** (insight for EU level implications) are focal points of the next and final chapter of this thesis.

Chapter 14

Recommendations & Conclusion

This chapter summarizes main points provided within the thesis, providing recommendations for both the case study sites (reflecting upon context specific issues), and overall recommendations (addressing general patterns of issues that could potentially be addressed at a common, EU level). The chapter brings to a close what this thesis supports and has attempted to achieve with the presented research and ends on a description of potential avenues of further research.

14.1 Case study recommendations and good practice examples

Good practice examples

The last part of this chapter highlights examples of practices that were considered by the researcher (and also by the key informants themselves) to be “good” or best practice examples, the contents of which support the evidence for **RQ1.b** *Are there practices which could be considered best practice examples?* as well as the latter half of the overall research **aim** with respect to potential recommendations for specific cases. A number of good practice examples were found in the databases in informational inventories in various cases, while other examples demonstrated substantial efforts in risk education and still others in organizational exercises. Good practice examples are not assumed to be immediately transferable should one example in one case potentially provide support to an issue addressed in another case. In large part, the prohibition of this assumption is based on the fact that each case has its own unique spatial context and, furthermore, a practice that is successful in one case can provide potential learning points for another case but is not necessarily directly transferrable. With this in mind, the following paragraphs highlight evidence of good practice examples within each of the case study sites as well as potential recommendations for issues identified. The reader is encouraged to note that this section presents a brief selection of key examples, and does not attempt to provide an exhaustive

list of issues and solutions for each case (information related to common and specific issues can also be found in consulting the comparative analysis presented in Chapter 12).

Nehoiu catchment (Romania)

With respect to the Nehoiu catchment, in this case study a **good practice example** was found in the use and reliance on local knowledge and the integration of this from local to county level decision making. The use of this information appears to be positively interpreted by both local and county levels, demonstrating a strong level of confidence in local knowledge of the territory and of those who possess this knowledge. Another positive example was the very strong level of trust and cooperation with a central actor at the county level; namely, the Emergency Situation Inspectorate for Buzău County. This organization, a product of the combination of civil protection and fire department services at the county level, in addition to emergency services provides also guidance, supervision, and information for a variety of actors. Although this actor presents a strong and positive example (which was also reiterated by a variety of other actors at both local and county levels), the importance of this actor and the burden of responsibility placed with this entity also reflects upon the key issue of actor pressure points presented in the comparative analysis chapter (chapter 12). Another positive example was found in the successful working relationship between the private consulting company BLOM and the Romanian National Waters Administration for the creation of flood hazard and risk maps. An additional positive and arguably good practice example can be found in the efforts and partnership between emergency management authorities and institutions for higher research (in relation to the creation and initial development of a landslide inventory) and between local authorities and research institutes (with respect to the development of a local research station used for gathering risk and hazard related information as well as for educational efforts for children.

Recommendations for this case study are directed towards the general lack of inventories and information organized in a central and open manner in terms of risk and hazard information, especially for flood and landslides phenomena. Although there are currently efforts underway for the formation of a landslide inventory, and though there are now flood risk maps available via the aforementioned partnership, an inventory of past events as well as the concentration and distribution of resources in addition to information about hazardous phenomena could prove to be a helpful and positive avenue for future research for this particular case. Potential learning points can be drawn from other cases presented within this thesis in terms of examples of such inventories and how they are managed openly and across difference vertical levels.

Barcelonnette catchment (France)

Good practice examples found within the Barcelonnette catchment case study include the integration of science and culture for the purpose of raising awareness at the local level. This can be seen in partnerships between scientific research conducted in the area and historical centers and associations that work together to inform and encourage public awareness through the use of a variety of different informational media. This, for example, has been seen with the development of the Séolane Barcelonnette research center. Other practices include the existence and development of online inventories and platforms made available to risk management and assessment actors as well as the general public. Examples of these were found in a database from the RTM which is an online source of information on past events, mitigation measures, and measurements made in the field dating back to the last 100 years. Another example is found in the risk information platform called RiskPACA created in a collaboration with the BRGM (geological survey authority) and the PACA regional authorities to consolidate previously fragmented data related to geophysical risks and hazards and to make this available for the public.

Recommendations for this case study include emphasis on emergency situation and scenario training and drills at the local level. This recommendation is based on observation and triangulation of different perspectives provided from several different types of key informants. It was observed that a number of community leaders expressed they would not know where to go for information on actions they can take themselves for protection and it was also stated by local emergency managers that there are no regularly conducted local level drills for training activities. Another related perception from a key informant in emergency management communicated that in the case of a drill that was conducted for the new emergency operations center (also new use and coordinative benefit of the Séolane Barcelonnette center) which attempted to enhanced efforts amongst emergency managers there were issues in terms of a lack of seriousness taken by higher level officials in the performance of the practice emergency scenario. The combination of these perceptions leads the researcher to believe that the evaluation and the carrying out of emergency scenarios at local level on a more regular basis could identify potential gaps and issues in the availability of information and coordination along the chain of command.

Wieprzówka catchment (Poland)

Good practice examples found within the Wieprzówka catchment included several shared information systems. One of which is a parcel lookup database created for the municipality of Wieprz. The municipality came up with the idea and contracted a private company to create the parcel lookup interface and system. This system is deemed

useful for regular citizens and also for crisis management as well as investors interested in purchasing, investing, or building on a parcel. People can find information directly about their parcel on this website, including regulations that apply for a particular project. People can also directly see how their land is affected by the local spatial development plan and by information related to flood and landslide hazards (which are also featured as part of the parcel specific information). This is viewed as a good example, particularly as it relates to openness and transparency of information and also serves as a helpful resource for the general public as well as emergency management and administrative authorities. Another good example was found in the ARCUS software system used by administrative and emergency management authorities at municipal, county and voivodeship levels, and serves as a connecting point for information across these levels. This system is updated daily and collects and shares information including: reports and warnings for the weather (e.g. rainfall, storm, or other warning) from the Voivode (or Regional) Crisis Management Center and information on the concentration and status of resources.

Recommendations for this case include the potential restructuring of civil protection and fire department authorities at the local (municipal) level. Currently these are kept separate; however, (and as stated by key informants during dissemination activities) there may be benefits to combining the two at this local level. The reasons for this included that the fire department often has more equipment and resources to respond and manage events and that they tend to have better knowledge of the area and require less time to mobilize than the civil protection. In the very least case, it is suggested that potentially more responsibilities be given to the fire department, particularly in the mountain areas.

Fella River catchment (Italy)

A good practice example found within the Fella River catchment also involves the creation of shared databases to improve coordination efforts. An example of this is found in the development of a shared landslide and mitigation measures inventory coordinated by the Geological Survey in collaboration with the Regional Civil Protection and the Forestry Services. Previously, there was an issue with regard to which of these authorities would respond to and construct structural mitigation measures in the case of a request from municipal authorities. One informant described a situation in which they received a call from a municipality, the authority went to the site to construct the mitigation measure, and upon arrival found that the measure had already been completed by another authority. This lack of communication and conflictual overlap is (according to informants from these authorities) no longer an issue due to the shared database in which each authority can see who is responding and constructing measures for which requests. Another example was found in the development of a shared web-based GIS system that features different

interfaces for the public (where the public can look up information related to emergency management but in a limited form) as well as emergency managers and administrative authorities (containing a far wider range of information such as the distribution of resources). Although the system is coordinated by the regional civil protection, other authorities including local administrative offices can add and alter information shared within this system.

The **recommendations** for this case target the maintenance of current mitigation measures, especially those installed after the 2003 centennial flood event. What was found upon the physical field visits as well as in discussion with a wide variety of key informants was that there is an overall lack of clarity with who is responsible for the clearing and general upkeep of mitigation measures, especially large-scale retention basins. The issue here is one of clarity of roles, the availability of funding, and general accountability of who (and particularly what administrative level) is responsible for this task and what kind of potential monitoring program (with mechanisms for earmarked funding) could help ensure fulfilment of this task. This issue is revisited in the general recommendations section, as it appeared to be held in common across cases to varying degrees.

In reflection of the selected points above, a few observations on overall positive practices shared across cases included the following:

- Improvements in the availability of information have been made through shared inventories and platforms including publically available websites. These examples have been shown to improve existing risk and hazard knowledge and in some cases improve previous issues in communication and cooperation amongst different actors.
- Partnerships with institutions of higher learning and research help enable development of risk and hazard related information and resources for the communication of this information to both actors and the public.
- Opportunities for the provision of informational centers and multiple sources of risk and hazard related information, and especially the focus on education information for the youth, are perceived as an important part of ensuring risk information reaches the community and helps encourage the integration of risk information (and discussion thereof) at the household level.

Observations can also be made with respect to issues that are held in common and reflect specific areas for improvement. A select few of these within the next section, focusing on general recommendations at a common (EU) level.

14.2 General recommendations and EU policy development

The section considers the common issues found across cases and presents a select few to address **RQ5** *Can the insight gleaned from the local level provide important implications for EU level policy development?* as well as the first part of **Objective 4** *Reflection and recommendations for future policy development at EU and case study levels.*

With respect to EU Directives, recommendations presented in this section focus on the **EU Floods Directive**, which draws attention to what can be suggested for policy in terms of assessing and managing water-related extremes, specifically flooding. This was determined to be the most relevant of current directives and indeed findings from the research indicate a fair number of potential changes that could be made to its contents.

Maintenance of mitigation measures (EU Floods Directive, Clause 14)

One key issue reiterated in this research and found in all cases is the maintenance of mitigation measures. This needs to be an integrated part of territorial planning processes. A guidance on this topic (including how to plan for this in the medium to long term, and for a variety of measures) could be given at supranational level and feature common procedures for how to deal with and integrate this as part of both disaster risk management and adaptation measures for future climate change affects, especially that which is attributable to extreme weather. The benefits of this could be multi-fold. This may help reduce the false sense of security around built structures that are assumed to be stable, yet require substantial maintenance. This could also help local as well as regional authorities in creating more feasible, long term plans that take into account the needs of both the present and future state of these structures and their effectiveness. Realizing actual cost in a long term scenario may also encourage authorities to rethink the economic efficiency of these structures in comparison to other preventative measures. Remedying this issue at the same time requires the clarity of roles in terms of who is responsible for payment, monitoring and upkeep (e.g. which can potentially vary depending on the value or cost of installment).

The first recommendation is therefore related to the issue of maintenance, namely that there is some mention of maintenance in Clause 14, but that this clause could and should go farther. This is related to issues for both accountability and effectiveness for measures and especially structural mitigation measures that were found in all case study sites. The recommendation is that the clause integrate necessary factors including the identification of a clear responsible authority and long term financial planning whenever possible. Other areas in which the issue of maintenance can be integrated are the Annexes. For Annex A, this can be added to Clause 5 for components of the first flood risk management plans, and within Annex B within Clauses 3 and 4 concerning plan updates. In the case of these

Annexes, the policy text could be amended to ensure the inclusion of maintenance costs projections in cost-benefit analyses. Of additional note is that the potential earmarking and follow through with medium to long term maintenance planning could also be considered as a component of the implementation of the Sendai Framework in the EU, particularly with respect to Priority 4. *Enhancing disaster preparedness for effective response and to “Build Back Better” in recovery, rehabilitation and reconstruction.*

Potential issue with equity in (EU Floods Directive, Clause 11)

The next suggested amendment is found in regard to a potential issue with equity (and to resources) in Clause 11, where it is stated that flood risks within certain areas could be considered to be insignificant, and explicitly refers to thinly populated or unpopulated areas. Although the clause goes on to state that each river basin will have to determine and assess the significance of these areas, issues found within the cases prompted concern from the research of how this clause could be interpreted in practice. In particular, concern can be found in whether this could limit attention to (and funding for) the assessment and management of flood risks in these areas. More isolated, and particularly mountainous areas could fall within this gamut of thinly populated or unpopulated areas. The recommendation is that the policy verbiage should be revised to reflect attempts to not disadvantage local, and especially less developed, sub-basins that are flood-prone. Supporting evidence from this includes an explicit example from the Polish case in which power and responsibility for flood risk mapping is taken over by the national level, however the strategy pursued by this level (in contrast to the regional level) will not cover all areas that are prone to flash flooding. Instead, the strategy will focus on strategic areas such as major cities. Another example is found in the perception from several informants in the French case that there is currently and will in the future not be enough support from the central administration as they (the communes in the Ubaye Valley) are not highly populated.

Inclusion of local knowledge (EU Floods Directive, Clause 13, Article 10)

Another key issue and recommendation is the inclusion of local knowledge into at least two key areas of the Directive’s text. Nowhere does the EU Floods Directive mention local knowledge, but substantial benefit could be derived from this. Connection can be found in Clause 13 which mentions the need to take into account certain characteristics of areas and to provide tailored solutions according to needs and priorities. Article 10 is also connected through its statement that active involvement should be encouraged. An amendment could be made to include a reference to the use of local knowledge for understanding needs and for encouraging “active involvement” in either or both Clause 13 and Article 10. Supporting evidence from the cases indicates and provides examples of the use of local knowledge and how this helps enhance informational resources as well as

greater potential citizen participation. For example, evidence can be seen in the village representation system in the Nehoiu catchment in Romania, and in the local emergency volunteer network in the municipalities and hamlets of the Fella River catchment. The integration of this knowledge can also be seen as important for areas that feature difficult terrain and very localized extreme phenomena (e.g. torrential rainfall and flash flooding).

Funding reference beyond Solidarity Funds (EU Floods Directive, Clause 8)

The last recommendation is related to funding mechanisms mentioned within the EU Floods Directive. The Directive refers to the Solidarity Fund in Clause 8. However, this Fund is only applicable to emergency operations and not for phases preceding emergency. The issue is that this does not provide funds for preventative actions or measures. The recommendation, therefore, is to remedy this within other funding regulations within Cohesion Policy, and to specifically have the EU Floods Directive explicitly make reference to the European Regional Development Fund (ERDF), Article 5, Clause 5, that refers to “promoting climate change adaptation, risk prevention and management. . .”. This amendment would support difficulties in finding funding and in drawing attention to the priority of prevention, particularly as lack of funding and attention to prevention was found in examples from several categories (Resources, Strategic Vision, and for Risk Culture “good” risk governance categories) and in multiple cases. This adjustment in policy can also help make a more explicit connection to potential funding for prevention activities and help regions and national level authorities better identify funding sources for future projects investing in such activities. Proposals for said projects utilizing the ERDF should, furthermore, be supported by empirical examples at the local level (such as those presented in the case evidence gathered for the aforementioned “good” risk governance categories), to provide context and to communicate practical relevance.

The last Directive recommendation transitions nicely to further recommendations for potential amendments to policy for **EU Structural Funds**, particularly funds within Cohesion Policy. The most relevant funds were found to be the **ERDF and the Cohesion Fund** as both draw connection to the Europe 2020 Strategy Goal for Sustainable Growth, Thematic Objective 2 “Promoting climate change adaptation, risk prevention and management”.

Adding explicit relevance to “difficult geographies” (ERDF, Clause 1, and Article 10)

In continuing from and supporting the previous amendment, a recommendation can be made for a revision to “areas with natural or demographic handicap” which is found in Clause 1, and in Article 10 of the ERDF. The question arises as to what is meant by such a “handicap” and to which type of areas does this refer? An answer to this question is found in reference to Point 4 of Article 121 of Regulation No 1303/2013, which states that

these areas include: (a) island Member States, (b) mountainous areas, and (c) sparsely and very sparsely populated areas. The issue found in this elaboration of areas is that there is no direct relevance for areas within hazard prone or “difficult” geographies, such as those that experience extreme local phenomena like the catchment cases presented in this thesis. Amending policy verbiage to make these areas more relevant would further assist in drawing attention and connecting to more opportunities to fund prevention activities that are currently lacking financial support. One can see several examples of this within the case studies such as for collaborative planning for structural mitigation measures (French case), structures but also prevention education (Romanian case), drainage infrastructure (Polish case), and maintenance operations (Italian case). This amendment would, furthermore, help in establishing a clearer link to the Europe 2020 Strategy Goal for Sustainable Growth, Thematic Objective 2 “Promoting climate change adaptation, risk prevention and management”.

Additional indicators for water-related disasters (both ERDF and Cohesion Fund, Annexes)

Another recommendation applies to both the ERDF and the Cohesion Fund.¹ Both contain the same indicators for “Risk prevention and management” listed within their respective annexes. However, there are currently only two indicators in total, and only one of these indicators is relevant for water-related disasters which refers to the number of persons benefiting from flood protection measures. Given issues revealed in the course of this research with respect to the availability of flood risk and hazard information especially at the local level, recommendations can be made as to how this single measurement could be expanded. An amendment and expansion could include: (1) the area covered within flood hazard maps in terms of percentage of the region as the unit of measurement, and (2) the area covered within flood risk maps (also with percentage of the region as the unit of measurement). This could help in encouraging greater coverage of areas affected by flood phenomena as opposed to point by point approaches (such as the focus on major cities but potential lack of coverage in the hinterland found in the Polish case), and could enhance greater synergy with the requirements of the EU Floods Directive.

Considerations for a (new) Communication: Establishing a “common voice” in a Community approach to Disaster Risk Reduction

An additional and more exploratory conclusion for policy can also be derived from the research findings with regard to considerations for a new EU Communication. The Communication, as a consequence of findings from the policy analysis could be called “Establishing a ‘common voice’ for a Community approach to Disaster Risk Reduction”. This

¹ The Polish and Romanian case study areas are located within the list of less developed regions (GDP per capita is < 75% average in EU-27) and are therefore listed as countries eligible for the Cohesion Fund.

would try to address and provide considerations for the call for a “common voice” found in the EU Communication: EU Strategy for Supporting Disaster Risk Reduction in Developing Countries {SEC (2009) 220}. The question can be asked: what should this “common voice” say? Some considerations based on the research are as follows and reflect what the Communication should encourage:

- **Regular checking and updating of contact information.** This is especially necessary for maintaining up to date information amongst the different agencies contacted during crisis, as well as for collection and updating of contact information of households or areas in which particular vulnerable groups reside. This is connected to issues of equity (vulnerable populations), and to resources and openness & transparency “good” risk governance categories. The recommendation additionally connects to the accessibility to and emergency services for the elderly – an important concern for EU regions managing issues arising from an increasing aging population. The consideration reflects good practice examples perceived in the Polish case which include regular information updates and drills, and efforts to remedy deficits in the French case through collection and creation of previously fragmented informational datasets on vulnerable individuals (especially elderly).
- **Creating and maintaining more open and inclusive knowledge networks.** This is also related to issues of equity in terms of who is included within local knowledge networks as well as resources and risk culture categories, particularly in terms of community information sharing and awareness raising (risk culture component) and as an important information resource (resources component). Consideration for the above is based on examples of local networks and how these have been positively perceived in the Romanian and Italian cases, as well as (in contrast) the issues for certain groups such as tourists and newcomers in the French case.
- **Centralization of hazard and risk information.** This consideration reflects the desire expressed in all cases to have all risk information available and accessible to authorities, and to a certain extent to the general public, and to have this information in one place. With respect to accessibility of information to the public, questions arose as to how much information should be made publically available and this appeared to depend on the sensitivity of the information. Consequently, the extent of openly available information to the public is still dependent upon the discretion of (often state) authorities. However, there was a trend by some sectoral actors across the French and Romanian cases that information created with public funds (meaning from tax payers) should also be made publically available. This consideration reflects issues as well as good examples within the categories resources and openness & transparency in terms of accessibility and of the existence of and collective interface or platform for these informational resources.

- **Stress on spatial function of vulnerability & connect explicitly to consideration in new Territorial Agenda (TA).** Connecting to and making a more explicit mention of the spatial dimension of vulnerability, which was found to be a key point in all cases, can enhance synergies between disaster risk reduction policy and the development of a new Territorial Agenda beyond the current TA 2020.
- **Use of local knowledge in complement to other sources.** Stress placed on the use of local knowledge and the encouragement of this as an important body of knowledge can act as a conduit toward more “active” participation in which local level stakeholders have greater potential for co-ownership in policy agenda framing and decision-making. This also connects to the previously recommended amendments to the EU Floods Directive as well as to literature and especially to the upper rungs of “Arnstein’s Ladder of participation”. However, this should be encouraged to use in complement to other sources of information, such as technical expertise, in order to build a more holistic understanding of local contexts.
- **Pursuit of multi-benefit approaches for prevention that connect to livelihood.** This was an issue that was found across the investigated cases and may require greater attention at the European level. It can also be understood as a problem of “livelihood vs. risk prevention” rather than “livelihood with risk prevention”. As a general observation, “livelihood” does not seem to be directly connected to “risk” and appears to be a significant factor in the lack of priority to issues related to risk, and especially prevention. This was found in the apparent disconnect of issues related to risks and hazards to the more pertinent issues of maintaining and enhancing local economy, and the day to day and societal issues (such as unemployment). What this necessitates is the pursuit of multi-benefit solutions that encourage connecting efforts, such as actions and policies for prevention, to strengthening livelihoods and reflecting the needs of the local community. This mean, for example, that prevention measures should be encouraged that are complementary to the success of key economic sectors such as protecting cultural heritage sites for tourism and protecting farm and grazing lands for local products among other sources of income. In directing attention to and publicizing these benefits, local authorities could realize greater preventive potential and in the long run reduce potential damages while connecting to immediate as well as long term needs of the community. This may also, consequently, help increase the visibility of the currently perceived (by the researcher and by key informants in all cases) invisible nature of risk prevention.
- **Integration and explicit statement of common factors for “building a culture of disaster risk prevention and mitigation”.** The last consideration concerns the issues of what are potential common factors for the understanding of a

“culture of prevention” in the European Community. The research found a number of factors that held importance across all cases, and at both local and regional levels. These factors have previously been mentioned in the comparative chapter (see Chapter 12), and to some extent can be found in various forms within various policy documents. However, these factors could be collectively presented and explicitly mentioned within new policy verbiage in order to present a clearer direction and collective understanding. These include, for reference: the ability to learn and adapt from past experiences (also targeting the building and use of local knowledge over time); the connection of people to place, and how important this is as an aspect of identity (connecting to the spatial dimension of vulnerability); perpetuation of disaster memory, especially in the form of education or awareness building; and the importance of prevention and the promotion of prevention-related activities. The lattermost is currently explicitly mentioned within various policy documents, but not necessarily in clear connection to the understanding of a “culture of prevention” for disaster risk reduction strategies in the European Community.

14.3 Critiques, gaps & avenues for further research

Although there is a lot the research presented in this thesis attempts to achieve, there is also a substantial range of potential ways to improve and expand upon the evidence base and aspects of the overall research approach. This section elaborates on a few such points, concentrating on: aspects of expanding and enhancing the policy analysis used to create the “good” risk governance category and indicator system; continuation and extension of connection mapping; and inclusion of stakeholder types not adequately addressed within the current research approach.

Policy analysis

As suggested in the previous chapter, the policy analysis can and should be expanded for further research. In order to permit adequate time for analyzing empirical material, the policy analysis needed to be completed mid-way through the project running time and, therefore, can and should be updated with relevant policy enacted from mid-2013 onward. This policy analysis could also be expanded to include a more international focus, particularly with the inclusion of the Sendai Framework for Action and the Sustainable Development Goals. Other potential avenues for expansion include policy for the new Territorial Agenda of the EU as well as integration of EU Cohesion Policy. These were deemed as outside the immediate scope of the policy analysis for risk governance, good governance, and disaster risk reduction based policy in the EU, but maintain relevance for future EU policy and could greatly strengthen the research with respect to connection and potential guidance given for future territorial development policy at the EU level. This is

of particular relevance given the incredibly important role territorial planning plays in the reduction of risks and especially the acknowledged (both in the literature and in-practice by a wide range of key informants across cases) spatial dimension as one of the most important factors in local and even individual level vulnerability.

Enhancing connection mapping

The research could benefit by continued connection mapping of both satellite cases. In the case of the presented research, the material provided in the mapping of the two main cases enabled more than adequate information to reveal and discuss connections between different principles of “good” risk governance. However, an expansion to the other cases could further strengthen connective arguments. The connection mapping could also benefit from a variety of different constellations and representations of the maps themselves. The selected presentation of the connection mapping featured in thesis treats the categories as all equal parts. However, visual alterations in size and node proximity could enhance potential visual inferences and could highlight specific relationships between particular categories.

Direct inclusion of media

Expanding the research to include an analysis of the role of media more directly would be another avenue of potential further research. This was only very indirectly touched upon by the information from key informants in terms of different information that had been made available. There was also limited information as to the perspective (overall view) held by the public with regard to the media as a source of information. However, some information could be drawn including:

- The media is a key source of information (all cases)
- The media should not be the only source of information (examples from the Romanian case)
- The media is a very regularly and highly used source for basic information such as weather for local events (examples from the French case)

The role of media is also a connecting point to previous research that could be expanded upon, such as the work of Marjory Anginard from the previous FP7 project, Mountain Risks (which considered the perspective of the population on the media and other actors). Future inclusion in the present research could be achieved by conducting semi-structured interviews to these actors and analyzing past material produced by the media in the different cases to derive patterns of general foci, such as what is covered, how often, and to what depth with respect to past extreme events. One can also consider how the role of media has potentially influenced the availability of funding provided and the scale of attention given to different types of extreme events over time (potentially also connecting to disaster

memory and the loss and perpetuation of this over time).

Another key research pursuit, and one in which this investigation will attempt to continue, is in understanding the role of prevention and risk culture, and underlying mechanisms across a variety of contexts as to the encouragement or inhibition of prevention capacities at the local level. This is of particular interest considering the attempt to develop a “common voice” at the EU level for disaster risk prevention and given the wide range of how this plays out in-practice as well as in the development of policy over time.

Bibliography

- Adger, Neil W., Arnell, Nigel W., and Tompkins, Emma L. Successful adaptation to climate change across scales. *Global Environmental Change*, 15(2):77–86, 2005. ISSN 09593780. doi: 10.1016/j.gloenvcha.2004.12.005.
- Age, Lars-Johan. Grounded Theory Methodology: Positivism, Hermeneutics, and Pragmatism. *The Qualitative Report*, 16(6):1599–1615, 2011.
- Agence de l'Eau Rhône-Méditerranée-Corse. Les caractéristiques du bassin Rhône-Méditerranée, n.d. URL <http://www.eaurmc.fr/le-bassin-rhone-mediterranee/les-caracteristiques-du-bassin-rhone-mediterranee.html>. Last visited 25 August 2016.
- Ammann, Walter J. Disaster Risk Reduction. In Bobrowsky, Peter T., editor, *Encyclopedia of natural hazards*, Springer reference, pages 170–175. Springer, Dordrecht and New York, 2013. ISBN 9789048186990.
- Anginard, Marjory. *Applying risk governance principles to natural hazards and risks in mountains*. Monography, Technical University of Dortmund, Dortmund, June 2011.
- Arnaud-Fassetta, Gilles, Cossart, Etienne, and Fort, Monique. Hydro-geomorphic hazards and impact of man-made structures during the catastrophic flood of June 2000 in the Upper Guil catchment (Queyras, Southern French Alps). *Geomorphology*, 66:41–67, 2005.
- Arnstein, Sherry R. A Ladder of Citizen Participation. *Journal of the American Institute of Planners*, 35(4):216–224, 1969. ISSN 0002-8991.
- Assmuth, Timo, Hilden, Mikael, and Benighaus, Christina. Integrated risk assessment and risk governance as socio-political phenomena: a synthetic view of the challenges. *The Science of the total environment*, 408(18):3943–3953, 2010. ISSN 0048-9697. doi: 10.1016/j.scitotenv.2009.11.034.
- Association Française pour la Prévention des Catastrophes Naturelles. Plate-forme française de réduction des risques de catastrophes, 2016. URL <https://afpcn.org/activites-internationales/>

- plate-forme-francaise-de-reduction-des-risques-de-catastrophes/. Last visited 26 August 2016.
- Baede, Alfons P.M., van der Linden, Paul, and Verbruggen, Aviel. *Annex II: Glossary of Synthesis Report: IPCC Fourth Assessment Report*. Intergovernmental Panel on Climate Change, 2007. URL https://www.ipcc.ch/pdf/assessment-report/ar4/syr/ar4_syr_appendix.pdf. Last visited 06/05/2015.
- Barcelonnette Office de Tourisme. Barcelonnette, n.d. URL <http://www.barcelonnette.com/>. Last visited 23 August 2016.
- Barredo, José I. Major flood disasters in Europe: 1950–2005. *Natural Hazards*, 42(1): 125–148, 2007. ISSN 0921-030X. doi: 10.1007/s11069-006-9065-2.
- Beck, Ulrich. The reinvention of politics: Towards a theory of reflexive modernization. In Beck, Ulrich, Giddens, Anthony, and Lash, Scott, editors, *Reflexive Modernization*. Stanford University Press, Stanford, Calif., 1994. ISBN 9780804724722.
- Beck, Ulrich. Living in the world risk society: A Hobhouse Memorial Public Lecture, 15 February 2006, London School of Economics. *Economy and Society*, 35(3):329–345, 2006.
- Berkes, Fikret, Colding, Johan, and Folke, Carl. *Navigating social-ecological systems: Building resilience for complexity and change*. Cambridge University Press, Cambridge, 2003. ISBN 0521815924.
- Bhattacharya, Namrata. *Flood risk assessment in Barcelonnette, France*. Faculty of Geo-Information Science and Earth Observation, University of Twente, Twente, The Netherlands, 2010.
- Biesbroek, Robbert G., Swart, Rob J., Carter, Timothy R., Cowan, Caroline, Henrichs, Thomas, Mela, Hanna, Morecroft, Michael D., and Rey, Daniela. Europe adapts to climate change: Comparing National Adaptation Strategies. *Governance, Complexity and Resilience*, 20(3):440–450, 2010. ISSN 0959-3780. doi: 10.1016/j.gloenvcha.2010.03.005.
- Birkmann, Joern. Measuring Vulnerability: Expert Workshop in Kobe, Japan, 2006a. URL <http://collections.unu.edu/eserv/UNU:1889/pdf3888.pdf>.
- Birkmann, Jörn. Indicators and criteria for measuring vulnerability: Theoretical bases and requirements. In Birkmann, Jörn, editor, *Measuring vulnerability to natural hazards*, pages 55–77. United Nations University, Tokyo and New York, 2006b. ISBN 9280871056.

- Birkmann, Jörn. *Measuring vulnerability to natural hazards: Towards disaster resilient societies*. United Nations University Press, Tokyo and New York, second edition, 2013. ISBN 9280812025.
- Birkmann, Jörn and von Teichman, Korinna. Integrating disaster risk reduction and climate change adaptation: Key challenges—scales, knowledge, and norms. *Sustainability Science*, 5(2):171–184, 2010. ISSN 1862-4065. doi: 10.1007/s11625-010-0108-y.
- Bissolli, Peter, Friedrich, Karsten, Rapp, Jörg, and Ziese, Markus. Flooding in eastern central Europe in May 2010 – reasons, evolution and climatological assessment. *Weather*, 66(6):147–153, 2011. ISSN 1477-8696. doi: 10.1002/wea.759. URL <http://onlinelibrary.wiley.com/doi/10.1002/wea.759/full>.
- Bobrowsky, Peter T., editor. *Encyclopedia of Natural Hazards*. Springer reference. Springer, Dordrecht and New York, 2013. ISBN 9789048186990.
- Bosselmann, Klaus, Engel, Ron, and Pru, Taylor. *Governance for Sustainability – Issues, Challenges, Successes*. International Union for Conservation of Nature and Natural Resources (IUCN), Gland, Switzerland, 2008.
- Bouwer, Laurens M., Huitema, Dave, and Aerts, Jeroen C.J.H., editors. *Adaptive flood management: the role of insurance and compensation in Europe*, Institute for Environmental Studies, Faculty of Earth and Life Sciences, Vrije Universiteit, 2007.
- Bradbury, Judith A. The policy implications of differing concepts of risk. *Science, Technology, & Human Values*, 14(4):380–399, 1989.
- British and Irish Ombudsman Association. Guide to principles of good governance, October 2009. URL <http://www.ombudsmanassociation.org/docs/BIOAGovernanceGuideOct09.pdf>. Last visited 19 February 2013.
- Brugha, Ruairí and Varvasovszky, Zsuzsa. Stakeholder analysis: a review. *Health Policy and Planning*, 15(3):239–246, 2000. ISSN 14602237. doi: 10.1093/heapol/15.3.239.
- Bulkeley, Harriet. Governing climate change: The politics of risk society? *Transactions of the Institute of British Geographers*, 26(4):430–447, 2001. ISSN 0020-2754. doi: 10.1111/1475-5661.00033.
- Burrell, Gibson and Morgan, Gareth. *Sociological paradigms and organisational analysis: Elements of the sociology of corporate life*. Ashgate, Farnham, Surrey, England and Burlington, Vt., U.S.A., 2008. ISBN 9781857421149.
- Cardona, Omar D., Hurtado, Jorge E., Duque, Gonzalo, Moreno, Alvaro, Chardon, Ann C., Velásquez, Luz S., and Prieto, Samuel D. *The Notion of Disaster Risk: Conceptual*

- Framework for Integrated Management: Indicators for Disaster Risk Management*. Universidad Nacional de Colombia, Sede Manizales, Instituto de Estudios Ambientales, Manizales, Columbia, 2003.
- Chamber of Deputies of the Parliament of Romania. Constitution of Romania, 2003. URL <http://www.cdep.ro/pls/dic/site.page?id=371>. Last visited 28 August 2016.
- Changing Hydro-meteorological Risks as Analyzed by a New Generation of European Scientists. D4.1. Inventory of risk management strategies in Europe focusing on land use planning and emergency preparedness: Work Package 4 - Adapting risk management strategies to future changes, 2012.
- Ciurean, Roxana, Zumpano, Veronica, and Malek, Žiga. Case study area Buzău County, Romania fieldwork report (part I), 2012. URL http://www.changes-itn.eu/Portals/0/Content/Test%20sites/Romania/Field%20Report_Buzau_July2012_II.pdf. Last visited 29 January 2015.
- Commission of the European Communities. Council Directive of 24 June 1982 on the major-accident hazards of certain industrial activities (as amended by Council Directive 87/216/EEC of 19 March 1987 (OJ L 85, 28.3.87, p. 36) and by Council Directive 88/610/EEC of 24 November 1988, OJ L 336, 7.12.88, p. 14)): 82/501/EEC, 1982.
- Commission of the European Communities. European Governance: A White Paper: COM(2001) 428 final, 2001.
- Commission of the European Communities. Communication from the Commission to the European Parliament and the Council on Reinforcing the Union's Disaster Response Capacity: COM(2008) 130 final, 2008a.
- Commission of the European Communities. Communication from the Commission to the European Parliament and the Council: Towards a stronger European disaster response: the role of civil protection and humanitarian assistance: COM(2008) 130 final, 2008b.
- Commission of the European Communities. Communication from the Commission to the Council and the European Parliament on an EU Strategy for Supporting Disaster Risk Reduction in Developing Countries: COM(2009) 84 final, 2009a.
- Commission of the European Communities. Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions on A Community approach on the prevention of natural and man-made disasters: COM(2009) 82 final, 2009b.
- Commission of the European Communities. White Paper: Adapting to Climate Change: Towards a European Framework for Action: COM(2009) 147 final, 2009c.

- Communauté de Communes Vallée de l'Ubaye. Présentation, n.d.a. URL <http://www.ccvu.fr/presentation.html>. Last visited 23 August 2016.
- Communauté de Communes Vallée de l'Ubaye. Les statuts et les compétences, n.d.b. URL <http://www.ccvu.fr/statuts-competences.html>. Last visited 24 August 2016.
- Communauté de Communes Vallée de l'Ubaye. Syndicat mixte de protection contre les crues dans le bassin de l'Ubaye - Ubayette, n.d.c. URL <http://www.ccvu.fr/syndicat-mixte-de-protection-contre-les-crues.html>. Last visited 24 August 2016.
- Commune de Barcelonnette. Plan Communal de Sauvegarde: PCS, 2013.
- Commune de Barcelonnette. Révision générale du POS Elaboration du PLU: Diagnostic territorial synthétique 10/12/2015, 2015. URL <http://www.ville-barcelonnette.fr/images/accueil/plu-diagnostic-synthetic.pdf>. Last visited 23 August 2016.
- Council of the European Union. Draft Conclusions on a Community Framework on disaster prevention within the EU, 2009.
- Creswell, John W. *Research design: Qualitative, quantitative, and mixed methods approaches*. Sage, Los Angeles, 3rd ed. edition, 2009. ISBN 1412965578.
- Cutter, Susan L. Vulnerability to environmental hazards. *Progress in Human Geography*, 20(4):529–539, 1996. ISSN 0309-1325. doi: 10.1177/030913259602000407.
- Cutter, Susan L. Vulnerability. In Bobrowsky, Peter T., editor, *Encyclopedia of Natural Hazards*, Springer reference, pages 1088–1090. Springer, Dordrecht and New York, 2013. ISBN 9789048186990.
- Cutter, Susan L. and Finch, Christina. Temporal and spatial changes in social vulnerability to natural hazards. *Proceedings of the National Academy of Sciences of the United States of America*, 105(7):2301–2306, 2008. ISSN 0027-8424. doi: 10.1073/pnas.0710375105.
- Cutter, Susan L., Boruff, Bryan J., and Shirley, W. Lynn. Social Vulnerability to Environmental Hazards. *Social Science Quarterly*, 84(2):242–261, 2003. doi: 10.1111/1540-6237.8402002.
- Daniell, Kathrin A., Milner, Hugh M., and Squires, Victor R. Uniting Perspectives: People and Place in River Basin Management. In Squires, Victor R., Milner, Hugh M., and Daniell, Kathrin A., editors, *River Basin Management in the Twenty-first Century*, pages 467–483. CRC Press, Boca Raton and London and New York, 2014.
- De Blasio, Fabio Vittorio. *Introduction to the physics of landslides: Lecture notes on the dynamics of mass wasting*. Springer, 2011. ISBN 9400711220.

- De Marchi, Bruna and Ravetz, Jerome R. Risk management and governance: a post-normal science approach. *Futures*, 31(7):743–757, 1999. ISSN 00163287. doi: 10.1016/S0016-3287(99)00030-0.
- De Marchi, Bruna, Scolobig, Anna, Delli Zotti, Giovanni, and Del Zotto, Maura. Risk construction and social vulnerability in an Italian Alpine Region: Appendix 8. The Malborghetto-Valbruna case-study, 2007.
- de Vries, Aldert. European territories confronted with climate change: Awaiting the events or timely preparation? *Europe 2030: Territorial Scenarios*, 42(8):825–832, 2010. ISSN 0016-3287. doi: 10.1016/j.futures.2010.04.014.
- Denzin, Norman K. Triangulation 2.0. *Journal of Mixed Methods Research*, 6(2):80–88, 2012. ISSN 1558-6898. doi: 10.1177/1558689812437186.
- Dikau, Richard, Brunsten, Denys, Schrott, Lothar, and Ibsen, Maïa-Laura. *Landslide recognition: Identification, movement, and causes*, volume no. 5 of *Publication / International Association of Geomorphologists*. John Wiley & Sons, Ltd, Chichester and New York, 1996. ISBN 9780471964773.
- Dworzecki, Jacek. Crisis Management System in Poland. *The Science for Population Protection*, 2:1–15, 2012. URL <http://www.population-protection.eu/prilohy/casopis/eng/11/52.pdf>. Last visited 2 September 2016.
- Eisenhardt, Kathleen M. Building Theories from Case Study Research. In Huberman, A. Michael and Miles, Matthew B., editors, *The qualitative researcher's companion*. Sage Publications, Thousand Oaks, CA, 2002. ISBN 9780761911913.
- ESPON Climate. Climate Change and Territorial Effects on Regions and Local Economies: Summary Report, 2011. URL https://www.espon.eu/export/sites/default/Documents/Projects/AppliedResearch/CLIMATE/ESPON_Climate_SummaryReport_final.pdf. Last visited 27 August 2016.
- European Commission. Communication from the Commission to the European Parliament and the Council: The EU Internal Security Strategy in Action: Five steps towards a more secure Europe: COM(2010) 673 final, 2010.
- European Commission. Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions: A Budget for Europe 2020: SEC(2011) 686 final, 2011a.
- European Commission. Proposal for a Decision of the European Parliament and of the Council on a Union Civil Protection Mechanism: COM(2011) 934 final, 2011b.

- European Commission. Report from the Commission to the European Parliament and the Council on the evaluation of the application of the Civil Protection Mechanism and the Civil Protection Financial Instrument for the years 2007-2009: SEC(2011) 1311 final, 2011c.
- European Commission. Common Implementation Strategy for the Water Framework Directive (2000/60/EC) and the Floods Directive (2007/60/EC): Strengthening the implementation of EU water policy through the second river basin management plans, 2013a.
- European Commission. Green Paper on the insurance of natural and man-made disasters: COM(2013) 213 final, 2013b.
- European Commission. Country Profiles - Italy, 2015a. URL http://ec.europa.eu/echo/files/civil_protection/vademecum/it/2-it.html. Last visited 04 September 2016.
- European Commission. France - Disaster management structure: Vademecum - Civil Protection, 2015b. URL http://ec.europa.eu/echo/files/civil_protection/vademecum/fr/2-fr-1.html. Last visited 25 August 2016.
- European Environment Agency. River Basin, 2000. URL http://glossary.eea.europa.eu/EEAGlossary/R/river_basin. Last visited 31 August 2016.
- European Environment Agency. Urban adaptation to climate change in Europe, Challenges and opportunities for cities together with supportive national and European policies, 2012.
- European Forum for Disaster Risk Reduction. The 2nd Meeting of the European Forum for Disaster Risk Reduction, 2011.
- European Organization for Security. White Paper Towards a Harmonized EU Civil Protection, 2009.
- European Union. Poland: EU Member Countries, 2016a. URL http://europa.eu/european-union/about-eu/countries/member-countries/poland_en. Last visited 2 September 2016.
- European Union. Romania: EU Member Countries, 2016b. URL http://europa.eu/european-union/about-eu/countries/member-countries/romania_en. Last visited 2 September 2016.
- Evered, Roger. So what is strategy? *Long Range Planning*, 16(3):57–72, 1983.
- Felt, Ulrike, Wynne, Brian, Callon, Michel, Gonçalves, Maria E., Jasanoff, Sheila, Jepsen, Maria, Joly, Pierre-Benoit, Konopasek, Zdenek, May, Stefan, Neubauer,

- Claudia, Rip, Arie, Siune, Karen, Stirling, Andy, and Tallacchini, Mariachiara. Taking European knowledge society seriously: Report of the Expert Group on Science and Governance to the Science, Economy and Society Directorate, 2007. URL http://ec.europa.eu/research/science-society/document_library/pdf_06/european-knowledge-society_en.pdf. Last visited 5 September 2016.
- Firus, Katja, Fleischhauer, Mark, Greiving, Stefan, and Grifoni, Patrizia. Planning and implementing communication and public participation in flood risk management: Procedural guidelines and toolbox of methods, 2011.
- Fischer, Frank. Deliberative Policy Analysis as Practical Reason: Integrating Empirical and Normative Arguments. In Fischer, Frank, Miller, Gerald, and Sidney, Mara S., editors, *Handbook of public policy analysis*, volume 125 of *Public administration and public policy*, pages 223–236. CRC/Taylor & Francis, Boca Raton, 2007. ISBN 1574445618.
- Fischer, Frank and Gottweis, Herbert. Introduction: The Argumentative Turn Revisited. In Fischer, Frank and Gottweis, Herbert, editors, *The argumentative turn revisited*, pages 1–27. Duke University Press, Durham, 2012. ISBN 082235263X.
- Fischhoff, Baruch. Informed consent in societal risk-benefit decisions. *Technological Forecasting and Social Change*, 13:347–357, 1979. ISSN 00401625.
- Fischhoff, Baruch, Slovic, Paul, and Lichtenstein, Sarah. The public vs. "the experts". In Covello, Vincent T., Flamm, W. Gary, Rodricks, Joseph V., and Tardiff, Robert G., editors, *The Analysis of Actual Versus Perceived Risks*, volume 1 of *Advances in Risk Analysis*, pages 235–249. Springer US, Boston, MA, 1983. ISBN 1461337623.
- Flageollet, Jean-Claude, Maquaire, Olivier, and Weber, Dominique. The temporal stability and activity of landslides in Europe with respect to climatic change (TESLEC): Final National Report (June 1996), 1996.
- Fleischhauer, Mark. Spatial Relevance of Natural and Technological Hazards: Natural and technological hazards and risks affectin the spatial development of European regions. *Geological Survey of Finland*, Special Paper 42:7–16, 2006.
- Flyvbjerg, Bent. Five Misunderstandings About Case-Study Research. *Qualitative Inquiry*, 12(2):219–245, 2006. ISSN 1077-8004. doi: 10.1177/1077800405284363.
- Fonseka, Leo. Indicator Tools for Assessment and Analysis of City Governance, 2000. URL <http://info.worldbank.org/etools/docs/library/110657/goa/assets/g-fonseka-mod02.pdf>. Last visited 19 February 2013.
- Forester, John. Policy analysis as critical listening. In Moran, Michael, Rein, Martin, and Goodin, Robert E., editors, *The Oxford handbook of public policy*, The Oxford handbooks

- of political science, pages 124–151. Oxford University Press, Oxford and New York, 2006. ISBN 0199269289.
- Gaetani, Francesco, Parodi, Antonio, Siccardi, Franco, Miozzo, Davide, and Trasforini, Eva. The Structure, Role and Mandate of Civil Protection in Disaster Risk Reduction for South Eastern Europe: South Eastern Europe Disaster Mitigation and Adaptation Programme, 2008. URL http://www.unisdr.org/files/9346_Europe.pdf. Last visited 28 January 2015.
- Galperin, Alexandra and Wilkinson, Emily. Strengthening Disaster Risk Governance: UNDP Support during the HFA Implementation Period 2005-2015, 2015. URL <http://www.undp.org/content/dam/undp/library/crisis%20prevention/disaster/Strengthening%20Disaster%20Risk%20Governance-Full-Report.pdf>. Last visited 13.08.2015.
- Gandy, M. Ecology, modernity and the intellectual legacy of the Frankfurt School. In Light, Andrew and Smith, Jonathan M., editors, *Space, place, and environmental ethics*, volume 1 of *Philosophy and geography*, pages 231–254. Roman & Littlefield Publishers, Lanham, 1997. ISBN 9780847682218.
- Gardner, James S. Risk Complexity and Governance in Mountain Environments. In Fra Paleo, Urbano, editor, *Risk governance*, pages 349–371. Springer, Dordrecht, 2015. ISBN 940179328X.
- Geertz, Clifford. *The interpretation of cultures: Selected essays*. Basic Books, New York, 1973. ISBN 9780465034253.
- German Advisory Council on Global Change. *World in Transition: Strategies for Managing Global Environmental Risks*. Annual Report. Secretariat at the Alfred Wegener Institute for Polar and Marine Research, Berlin, 2000.
- Gerring, John. The Case Study: What it is and what it does. In Boix, Carles and Stokes, Susan Carol, editors, *The Oxford handbook of comparative politics*, The Oxford handbooks of political science, pages 90–122. Oxford University Press, Oxford and New York, 2007. ISBN 019956602X.
- Gibbert, M. and Ruigrok, W. The "What" and "How" of Case Study Rigor: Three Strategies Based on Published Work. *Organizational Research Methods*, 13(4):710–737, 2010. ISSN 1094-4281. doi: 10.1177/1094428109351319.
- Glade, Thomas, Anderson, Malcolm, and Crozier, Michael J., editors. *Landslide Hazard and Risk*. John Wiley & Sons, Ltd, Chichester, West Sussex, England, 2005. ISBN 9780470012659. doi: 10.1002/9780470012659.

- Glaser, Barney G. *Theoretical sensitivity*. Advances in the methodology of grounded theory. Soc. Pr., Mill Valley, Calif., 1978. ISBN 9781884156014.
- Glaser, Barney G. Conceptualization: On theory and theorizing using grounded theory. *International Journal of Qualitative Methods*, 1(2):23–38, 2002.
- Glaser, Barney G. and Strauss, Anselm L. *The discovery of grounded theory: Strategies for qualitative research*. Observations. Aldine Pub. Co., Chicago, 1967. ISBN 9780202302607.
- Głowacki, Wiktor and Komenda, Janusz. Field Trip Information: Wieprzówka and Stryszawa Study Area, 2011a.
- Głowacki, Wiktor and Komenda, Janusz. Poland. Wieprzówka catchment, 2011b. URL <http://changes-itn.eu/StudyAreas/Poland/tabid/83/Default.aspx>. Last visited 1 September 2016.
- Graham, John, Amos, Bruce, and Plumptre, Tim. *Principles for Good Governance in the 21st Century*. Policy Brief No.15. Institute on Governance, Ottawa, Canada, August 2003.
- Greiving, Stefan, Fleischhauer, Mark, and Wanczura, Sylvia. Management of Natural Hazards in Europe: The Role of Spatial Planning in Selected EU Member States. *Journal of Environmental Planning and Management*, 49(5):739–757, 2006.
- Greiving, Stefan, Wanczura, Sylvia, Voßbürger, Petra, Sucker, Kirsten, and Fourman, Morel. Deliverable 1.2: Scalable resilience and risk governance concept including guidelines on stakeholder involvement, 2007.
- Greiving, Stefan, Zebisch, Marc, Schneiderbauer, Stefan, Fleischhauer, Mark, Lindner, Christian, Lückenötter, Johannes, Buth, Mareike, Kahlenborn, Walter, and Schauer, Inke. A consensus based vulnerability assessment to climate change in Germany. *International Journal of Climate Change Strategies and Management*, 7(3):306–326, 2015. ISSN 1756-8692. doi: 10.1108/IJCCSM-11-2013-0124.
- Guba, Egon and Lincoln, Yvonna S. Competing Paradigms in Qualitative Research. In Denzin, Norman K. and Lincoln, Yvonna S., editors, *Handbook of qualitative research*, pages 105–117. Sage Publications, Thousand Oaks, 1994. ISBN 9780803946798.
- Guha-Sapir, Debby, Vos, Femke, Below, Regina, and Ponserre, Sylvain. Annual Disaster Statistical Review 2011: The numbers and trends, 2012. URL www.cred.be/sites/default/files/ADSR_2011.pdf.

- Guha-Sapir, Debby, Hoyois, Philippe, and Below, Regina. Annual Disaster Statistical Review 2014: The numbers and trends, 2015. URL http://www.cred.be/sites/default/files/ADSR_2014.pdf.
- Guha-Sapir, Debby, Below, Regina, and Hoyois, Philippe. EM-DAT Database, 2016. URL www.emdat.be. Last visited 2 September 2016.
- Heriard-Dubreuil, Gilles F. Present challenges to risk governance. *Journal of Hazardous Materials*, 86(1-3):245–248, 2001. ISSN 03043894. doi: 10.1016/S0304-3894(01)00261-8.
- Herriott, Robert E. and Firestone, William A. Multisite Qualitative Policy Research: Optimizing Description and Generalizability. *Educational Researcher*, 12(2):14–19, 1983. ISSN 0013-189X. doi: 10.3102/0013189X012002014.
- Hewitt, Kenneth and Burton, Ian. *The hazardousness of a place: A regional ecology of damaging events*, volume 6 of *University of Toronto. Dept. of Geography. Research publications*. University of Toronto Press, University of Toronto, Dept. of Geography, Toronto, 1971. ISBN 9780802032836.
- Holling, Crawford S. Resilience and Stability of Ecological Systems. *Annual Review of Ecology and Systematics*, 4(1):1–23, 1973. ISSN 0066-4162. doi: 10.1146/annurev.es.04.110173.000245.
- Holling, Crawford S. and Goldberg, Michael. A. Ecology and Planning. *Journal of the American Institute of Planners*, 37(4):221–230, 1971. ISSN 0002-8991. doi: 10.1080/01944367108977962.
- Hong, Yang, Adhikari, Pradeep, and Gourley, Jonathan J. Flash Flood. In Bobrowsky, Peter T., editor, *Encyclopedia of natural hazards*, Springer reference, pages 324–325. Springer, Dordrecht and New York, 2013a. ISBN 9789048186990.
- Hong, Yang, Adhikari, Pradeep, and Gourley, Jonathan J. Flood hazard and disaster. In Bobrowsky, Peter T., editor, *Encyclopedia of natural hazards*, Springer reference, pages 326–336. Springer, Dordrecht and New York, 2013b. ISBN 9789048186990.
- Höppner, Corina, Buchecker, Matthias, and Bründl, Michael. Risk Communication and Natural Hazards, 2010.
- Howe, Kenneth R. Against the Quantitative-Qualitative Incompatibility Thesis or Dogmas Die Hard. *Educational Researcher*, 17(8):10–16, 1988. ISSN 0013-189X. doi: 10.3102/0013189X017008010.
- Huberman, A. Michael and Miles, Matthew B., editors. *The qualitative researcher's companion*. Sage Publications, Thousand Oaks, CA, 2002. ISBN 9780761911913.

Institut National de la Statistique et des Études Économiques. EPCI de La CC Vallée de l'Ubaye, 2013a. URL <http://www.insee.fr/fr/themes/comparateur.asp?codgeo=EPCI-240400374>. Last visited 23 August 2016.

Institut National de la Statistique et des Études Économiques. Populations légales 2013 de la commune: Barcelonnette, 2013b. URL <http://www.insee.fr/fr/ppp/bases-de-donnees/recensement/populations-legales/commune.asp?depcom=04019>. Last visited 23 August 2016.

Institut National de la Statistique et des Études Économiques. Populations légales 2013 de la commune: Jausiers, 2013c. URL <http://www.insee.fr/fr/ppp/bases-de-donnees/recensement/populations-legales/commune.asp?depcom=04096>. Last visited 23 August 2016.

Institut National de la Statistique et des Études Économiques. Populations légales 2013 de la commune: Faucon de Barcelonnette, 2013d. URL <http://www.insee.fr/fr/ppp/bases-de-donnees/recensement/populations-legales/commune.asp?depcom=04086>. Last visited 23 August 2016.

Institut National de la Statistique et des Études Économiques. Communes de l'arrondissement de Barcelonnette, n.d. URL <http://www.insee.fr/fr/methodes/nomenclatures/cog/cog.asp?nivgeo=arr&codgeo=041>. Last visited 24 August 2016.

Instituto Nazionale di Statistica. Demography in Figures: Geo Demo, 2011. URL http://demo.istat.it/pop2011/index1_e.html. Last visited 4 September 2016.

Institutul National de Statistica. Population and Housing Statistics: Nehoiu, 2015. URL <http://www.insse.ro/cms/ro>. Last visited 25 February 2016.

Intergovernmental Panel on Climate Change. Glossary of Terms. In Field, Christopher B., Vicente Barros, Thomas F. Stocker, Dahe Qin, David J. Dokken, Kristie L. Ebi, Michael D. Mastrandrea, Katharine J. Mach, Gian-Kasper Plattner, Simon K. Allen, Melinda Tignor, and Pauline M. Midgley, editors, *Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation*, pages 555–564. Cambridge University Press, Cambridge, UK, 2012a.

Intergovernmental Panel on Climate Change. Fact Sheet: IPCC Special Report on Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation. In Field, Christopher B., Barros, Vicente, Stocker, Thomas F., Qin, Dahe, Dokken, David J., Ebi, Kristie L., Mastrandrea, Michael D., Mach, Katharine J., Plattner, Gian-Kasper, Allen, Simon K., Tignor, Melinda, and Midgley, Pauline M., editors, *Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation*, A

- Special Report of Working Groups I and II of the Intergovernmental Panel on Climate Change. Cambridge University Press, Cambridge, 2012b.
- Intergovernmental Panel on Climate Change. Summary for Policymakers. In Field, Christopher B., Vicente Barros, Thomas F. Stocker, Dahe Qin, David J. Dokken, Kristie L. Ebi, Michael D. Mastrandrea, Katharine J. Mach, Gian-Kasper Plattner, Simon K. Allen, Melinda Tignor, and Pauline M. Midgley, editors, *Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation*, pages 1–19. Cambridge University Press, Cambridge, UK, 2012c.
- International Federation of Surveyors. *The Contribution of the Surveying Profession to Disaster Risk Management*. A publication of FIG Working Group 8.4. Copenhagen, Denmark, FIG Publication No. 38 edition, 2006.
- International Risk Governance Council. *White paper on Risk Governance: Towards an Integrative Approach*. White paper no. 1. Geneva, 2006.
- International Risk Governance Council. *Risk Governance Deficits: An analysis and illustration of the most common deficits in risk governance*. Report. Geneva, 2009.
- International Risk Governance Council. *Risk Governance Deficits: An analysis and illustration of the most common deficits in risk governance*. Policy Brief. Geneva, 2010.
- Jakle, John A., Brunn, Stanley D., and Roseman, Curtis C. *Human spatial behavior: A social geography*. Duxbury Press, North Scituate, Mass., 1976. ISBN 9780881331417.
- Kaplan, Thomas J. Reading Policy Narratives: Beginnings, Middles, and Ends. In Fischer, Frank and Forester, John, editors, *The Argumentative turn in policy analysis and planning*, pages 167–185. Duke University Press, Durham, N.C., 1993. ISBN 9780822313540.
- Kappe, Bert, Terpstra, Teun, van Buren, Daniel, Koops, Koos, Suilen, Andrea, and Geissler, Timm R. Interactive Learning Groups, 2006.
- Kasperson, Roger E., Renn, Ortwin, Slovic, Paul, Brown, Halina S., Emel, Jacque, Goble, Robert, Kasperson, Jeanne X., and Ratick, Samuel. The Social Amplification of Risk: A Conceptual Framework. *Risk Analysis*, 8(2):177–187, 1988. doi: 10.1111/j.1539-6924.1988.tb01168.x.
- Kowalczyk, Andrzej. Local Government in Poland: Chapter 5. Local Governments in Central and Eastern Europe. Administrative and Civil Service Reform – Country Reform Summaries, 2000.
- Kuhlicke, Christian, Steinführer, Annett, Begg, Chloe, Bianchizza, Chiara, Bründl, Michael, Buchecker, Matthias, de Marchi, Bruna, Di Masso Tarditti, Marina, Höpp-

- ner, Corina, Komac, Blaž, Lemkow, Louis, Luther, Jochen, McCarthy, Simon, Pellizzoni, Luigi, Renn, Ortwin, Scolobig, Anna, Supramaniam, Meera, Tapsell, Sue, Wachinger, Gisela, Walker, Gordon, Whittle, Rebecca, Zorn, Matija, and Faulkner, Hazel. Perspectives on social capacity building for natural hazards: outlining an emerging field of research and practice in europe. *Adapting to Climate Change: Reducing Water-related Risks in Europe*, 14(7):804–814, 2011. ISSN 1462-9011. doi: 10.1016/j.envsci.2011.05.001.
- Lacasse, Suzanne. Risk assessment. In Bobrowsky, Peter T., editor, *Encyclopedia of natural hazards*, Springer reference, pages 862–863. Springer, Dordrecht and New York, 2013. ISBN 9789048186990.
- Lavell, Allan, Oppenheimer, Michael, Diop, Cherif, Hess, Jeremy, Lempert, Robert, Li, Jianping, Muir-Wood, Robert, and Myeong, Soojeong. Climate Change: New Dimensions in Disaster Risk, Exposure, Vulnerability, and Resilience. In Field, Christopher B., Vicente Barros, Thomas F. Stocker, Dahe Qin, David J. Dokken, Kristie L. Ebi, Michael D. Mastrandrea, Katharine J. Mach, Gian-Kasper Plattner, Simon K. Allen, Melinda Tignor, and and Pauline M. Midgley, editors, *Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation*, pages 25–64. Cambridge University Press, Cambridge, UK,, 2012.
- Lee, Mark E. and Jones, David K. C. *Landslide risk assessment*. Thomas Telford, London, 2004. ISBN 0727731718.
- Lewis, Jane and Ritchie, Jane. Generalising from Qualitative Research. In Ritchie, Jane and Lewis, Jane, editors, *Qualitative research practice*, pages 263–286. Sage Publications, London and Thousand Oaks, Calif., 2003. ISBN 9780761971108.
- Lindell, Michael K. Risk Communication. In Bobrowsky, Peter T., editor, *Encyclopedia of natural hazards*, Springer reference, pages 870–875. Springer, Dordrecht and New York, 2013. ISBN 9789048186990.
- Little, Daniel. *Varieties of social explanation: An introduction to the philosophy of social science*. Westview Press, Boulder, 1991. ISBN 9780813305660.
- Mägdefrau, Nadine and Sprague, Teresa. Residents' participation in rebuilding more resilient space. In Greiving, Stefan, Ubaura, Michio, and Tešliar, Jaroslav, editors, *Spatial planning and resilience following disasters*, pages 295–319. Policy Press, Bristol, 2016.
- Malet, Jean-Philippe, Remaître, Alexandre, Thiery, Yannick, Maquaire, Olivier, Peyron, Michel, and Waeckel, Colin. Landslide hazard and risk management in the Barcelonnette Basin: some case studies: Intensive Course - Barcelona 1-4 September 2008, 2008.

- Marshall, Martin N. The key informant technique. *Family Practice*, 13(1):92–97, 1996. ISSN 0263-2136. doi: 10.1093/fampra/13.1.92.
- Massey, Eric and Bergsma, Emmy. Assessing adaptation in 29 European countries, 2008.
- Maxwell, Joseph A. Understanding and Validity in Qualitative Research. In Huberman, A. M. and Miles, Matthew B., editors, *The qualitative researcher's companion*. Sage Publications, Thousand Oaks, CA, 2002. ISBN 9780761911913.
- Mercer, Jessica. Knowledge and disaster risk reduction. In Wisner, Benjamin, Gaillard, J. C., and Kelman, Ilan, editors, *The Routledge handbook of hazards and disaster risk reduction*, pages 97–108. Routledge, London and New York, 2012. ISBN 0415590655.
- Mercer, Jessica, Gaillard, J. C., Crowley, Katherine, Shannon, Rachel, Alexander, Bob, Day, Simon, and Becker, Julia. Culture and disaster risk reduction: Lessons and opportunities. *Environmental Hazards*, 11(2):74–95, 2012. ISSN 1747-7891. doi: 10.1080/17477891.2011.609876.
- Michoud, Clément, Jaboyedoff, Michel, Derron, Marc-Henri, Nadim, Farrok, and Leroi, Eric. New classification of landslide-inducing anthropogenic activities. *Geophysical Research Abstracts*, 14, 2012. URL https://www.researchgate.net/profile/Michel_Jaboyedoff/publication/258616160_New_classification_of_landslide-inducing_anthropogenic_activities/links/553f87750cf24c6a05d23204.pdf.
- Micu, Mihai. Landslide Assessment: From Field Mapping to Risk Management. A Case-Study in the Buzău Subcarpathians. *Forum geografic*, X(1):70–77, 2011a. ISSN 1583-1523. doi: 10.5775/fg.2067-4635.2011.021.i.
- Micu, Mihai. Romania. Buzău County. CHANGES project case study description, 2011b. URL <http://www.changes-itn.eu/StudyAreas/Romania/tabid/82/Default.aspx>.
- Mission Risques Naturels. Newsletter: Special Issue - October 2012, 2012. URL http://www.mrn.asso.fr/system/files/MRN_Newsletter_%2019.pdf. Last visited 25 August 2016.
- Muică, Nicolae and Turnock, David. A toponomical approach to the agrarian history of the Pătârlagele Depression. *Journal of Studies & Research in Human Geography*, 2(2):27–49, 2008. URL <http://www.analegeo.uaic.ro/index.php/SciGeo/article/view/9>. Last visited 29 January 2015.
- Municipality of Andrychów. Powódź w gminie andrychów 24 sierpnia 2005 r. (flood in the municipality of andrychow 24 august 2005), 6 March 2013.

- Nadim, Farrokh. Hazard. In Bobrowsky, Peter T., editor, *Encyclopedia of natural hazards*, Springer reference, pages 425–426. Springer, Dordrecht and New York, 2013a. ISBN 9789048186990.
- Nadim, Farrokh. Mitigation. In Bobrowsky, Peter T., editor, *Encyclopedia of natural hazards*, Springer reference, pages 682–683. Springer, Dordrecht and New York, 2013b. ISBN 9789048186990.
- National Oceanic and Atmospheric Administration. Extreme Events, n.d. URL <https://www.ncdc.noaa.gov/climate-information/extreme-events>. Last visited 31 August 2016.
- National Research Council of the National Academies. *Facing Hazards and Disasters: Understanding Human Dimensions: Committee on Disaster Research in the Social Sciences: Future Challenges and Opportunities*. The National Academies Press, Washington, D.C., 2006.
- Newman, Peter and Thornley, Andy. *Urban Planning in Europe: International competition, national systems and planning projects*. Routledge, London, 1996.
- Nirumpama, Niru. Disaster risk management. In Bobrowsky, Peter T., editor, *Encyclopedia of Natural Hazards*, Springer reference, pages 164–170. Springer, Dordrecht and New York, 2013. ISBN 9789048186990.
- Official Journal of the European Communities. DIRECTIVE 2000/60/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 23 October 2000 establishing a framework for Community action in the field of water policy: EU Water Framework Directive, 2000.
- Official Journal of the European Communities. DIRECTIVE 2007/60/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 23 October 2007 on the assessment and management of flood risks: EU Floods Directive, 2007.
- Official Journal of the European Union. Council Decision of 5 March 2007 establishing a Civil Protection Financial Instrument: (2007/162/EC, Euratom), 2007a.
- Official Journal of the European Union. Council Decision of 8 November 2007 establishing a Community Civil Protection Mechanism: (2007/779/EC, Euratom), 2007b.
- Official Journal of the European Union. Treaty of Lisbon: Amending the Treaty on European Union and the Treaty Establishing the European Community: C 306/1, 2007c.
- Official Journal of the European Union. The Stockholm Programme – an Open and Secure Europe Serving and Protecting Citizens: (2010/C 115/01), 2010.

- Pôle Alpin d'Etudes et de Recherche pour la Prévention des Risques Naturels. Who does what in France? Stakeholders involved in natural risk mitigation and risk management, 2011. URL http://www.risknat.org/adaptalp/who-does-what/stakeholders_france.html. Last visited 24 August 2016.
- Popper, Karl R. *Objective knowledge; An evolutionary approach*. Clarendon Press, Oxford, 1972. ISBN 9780198750246.
- Popper, Karl R. *The logic of scientific discovery*. Routledge classics. Routledge, 2002. ISBN 9780415278447.
- Promoting Spatial Development by Creating COMMon MINdscapes. The Republic of Poland: County and Planning Systems, 2007.
- Quevauviller, Philippe, Peter, Denis, and Lipiatou, Elisabeth, editors. *Scientific and policy report: Reducing Water-related Risks in Europe*, 2010. European Commission, Directorate-General for Research and Innovation, Directorate I – Environment, Unit I.4 – climate change and natural hazards.
- Rao, Suman. Understanding risk culture and developing a 'soft' approach to risk assessment methodologies. In Morel, Benoit and Linkov, Igor, editors, *Environmental security and environmental management*, volume v. 5 of *NATO security through science series. Series C, Environmental security*, pages 201–210. Springer, Dordrecht, The Netherlands, 2006. ISBN 9781402038938.
- Renn, Ortwin. Components of the risk governance framework. In Boudier, Frédéric, Slavin, David, and Löfstedt, Ragnar, editors, *The tolerability of risk*, Risk, society and policy series, pages 7–20. Earthscan, London and Sterling, VA, 2009. ISBN 9781844073986.
- Renn, Ortwin and Walker, Katherine. Lessons learned: A re-assessment of the irgc framework on risk governance. In Renn, Ortwin and Walker, Katherine, editors, *Global Risk Governance*, pages 331–367. Springer, Dordrecht, The Netherlands, 2008.
- Rhodes, Roderick Arthur William. *Understanding governance: policy networks, governance, reflexivity and accountability*. Open University Press, Maidenhead, GB, Philadelphia, US, 1997.
- Ritchie, Jane. The Applications of Qualitative Methods to Social Research. In Ritchie, Jane and Lewis, Jane, editors, *Qualitative research practice*, pages 24–46. Sage Publications, London and Thousand Oaks, California, 2003. ISBN 9780761971108.
- Roe, Emery. *Narrative Policy Analysis: Theory and Practice*. Duke University Press, Durham and London, 1994.

- Romanian Chamber of Deputies. The Law No. 151/July 15, 1998 — Law on regional development in Romania: Law No. 151/1998, July 16, 1998.
- Rose, Richard. Models of Governing. *Comparative Politics*, 5(4):465–496, 1973.
- Rouse, Michael J. *Institutional Governance and Regulation of Water Services: The Essential Elements*. IWA Publishing, second edition edition, 2013.
- Saldaña, Johnny. *The coding manual for qualitative researchers*. Sage Publications, Thousand Oaks, California, second edition edition, 2013. ISBN 1446247376.
- Scharpf, Fritz W. *Games Real Actors Play: Actor-Centered Institutionalism in Policy Research*. Theoretical Lenses on Public Policy. Westview Press, 1997.
- Schipper, Lisa and Pelling, Mark. Disaster risk, climate change and international development: scope for, and challenges to, integration. *Disasters*, 30(I):19–38, 2006.
- Schmidt-Thomé, Philipp and Greiving, Stefan. Response to Natural Hazards and Climate Change in Europe. In Faludi, Andreas, editor, *European spatial research and planning*, pages 167–186. Lincoln Institute of Land Policy, Cambridge, MA, 2008. ISBN 1558441778.
- Schmidt-Thomé, Philipp and Juhola, Sirkku. Adaptation. In Bobrowsky, Peter T., editor, *Encyclopedia of natural hazards*, Springer reference, pages 3–5. Springer, Dordrecht and New York, 2013. ISBN 9789048186990.
- Schneider, Thierry, Schieber, Caroline, Vaillant, Ludovic, Heriard-Dubreuil, Gilles F., Gadbois, Serge, Oudiz, André, Bourgoignon, Michel, Milochevitch, Alexandre, Paterson, John, Brownless, George, Bandle, Tony, Hansson, Sven-Ove, and Hayenhjelm, Madeleine. *Comparative Analysis of Risk Governance for Radiological and Chemical Discharges of Industrial Installations*, 2004.
- Scolobig, Anna, De Marchi, Bruna, and Borga, Marco. The missing link between flood risk awareness and preparedness: Findings from case studies in an Alpine Region. *Natural Hazards*, 63(2):499–520, 2012. ISSN 0921-030X. doi: 10.1007/s11069-012-0161-1.
- Seale, Clive. *The Quality of Qualitative Research*. Blackwell, Oxford, 1999.
- Silverman, David. *Interpreting qualitative data: Methods for analyzing talk, text, and interaction*. Sage Publications, London and Thousand Oaks, Calif., 3rd ed. edition, 2006. ISBN 9781412922456.
- Sivan, Olivier. *Torrents de la vallée de l’Ubaye*, 2000.
- Slovic, Paul. Trust, Emotion, Sex, Politics and Science: Surveying the Risk-Assessment Battlefield. *Risk Analysis*, 19(4):689–701, 1999.

- Squires, Victor R. People and Place as Determinants of Success or Failure to Meet Management Objectives in River Basins. In Squires, Victor R., Milner, Hugh M., and Daniell, Kathrin A., editors, *River Basin Management in the Twenty-first Century*, pages 371–396. CRC Press, Boca Raton and London and New York, 2014.
- Squires, Victor R., Milner, Hugh M., and Daniell, Kathrin A., editors. *River Basin Management in the Twenty-first Century: Understanding People and Place*. CRC Press, Boca Raton and London and New York, 2014.
- Stake, Robert. The case study method in social enquiry. *Education Researcher*, 7:5–8, 1978.
- Stake, Robert. Case Studies. In Denzin, Norman K. and Lincoln, Yvonna S., editors, *Handbook of qualitative research*. Sage Publications, Thousand Oaks, 1994. ISBN 9780803946798.
- Steinfuehrer, Annett, Kuhlicke, Christian, and Begg, Chloe. CapHaz-Net. Social Capacity Building for Natural Hazards: Toward More Resilient Societies, 2011.
- Stern, Paul C. and Fineberg, Harvey V. *Understanding risk: Informing decisions in a democratic society*. National Academy Press, Washington, D.C., 1996. ISBN 9780585002422.
- Strauss, Anselm and Corbin, Juliet. Grounded Theory Methodology: An Overview. In Denzin, Norman K. and Lincoln, Yvonna S., editors, *Handbook of qualitative research*. Sage Publications, Thousand Oaks, 1994. ISBN 9780803946798.
- Surd, Vasile, Kassai, Ianos, and Giurgiu, Laura. Romania disparities in regional development. *Procedia - Social and Behavioral Sciences*, 19:21–30, 2011. ISSN 18770428. doi: 10.1016/j.sbspro.2011.05.102.
- Thiery, Yannick., Malet, Jean-Philippe, Sterlacchini, Simone, Puissant, Anne, and Maquaire, Olivier. Landslide susceptibility assessment by bivariate methods at large scales: Application to a complex mountainous environment. *Geomorphology*, 92:38–59, 2007.
- Tracy, Sarah J. *Qualitative research methods: Collecting evidence, crafting analysis, communicating impact*. Wiley-Blackwell, Chichester, West Sussex, UK, 2013. ISBN 140519202X.
- Tricart, Jean. La crue de la mi-juin 1957 sur le guil, l'ubaye et la cerveyrette. *Revue de géographie alpine*, 46(4):565–627, 1958. doi: 10.3406/rga.1958.1846. URL http://www.persee.fr/docAsPDF/rga_0035-1121_1958_num_46_4_1846.pdf.

- TRUSTNET European Concerted Action. *The TRUSTNET Framework: A New Perspective on Risk Governance*, 1999.
- United Nations. *Republic of Poland: Public Administration Country Profile*. Division for Public Administration and Development Management (DPADM), Department of Economic and Social Affairs, 2004. URL <http://unpan1.un.org/intradoc/groups/public/documents/un/unpan023221.pdf>. Last visited 2 September 2016.
- United Nations. *Republic of France: Public Administration Country Profile*. Division for Public Administration and Development Management (DPADM). Department of Economic and Social Affairs, 2006. URL <http://unpan1.un.org/intradoc/groups/public/documents/un/unpan023308.pdf>. Last visited 24 August 2016.
- United Nations. *Summary and Recommendations: 2009 Global Assessment Report on Disaster Risk Reduction: Risk and poverty in a changing climate: Invest today for a safer tomorrow*, 2009.
- United Nations. *Global Assessment Report on Disaster Risk Reduction 2015: Making Development Sustainable: The Future of Disaster Risk Management Making Development Sustainable: The Future of Disaster Risk Management Making Development Sustainable: The Future of Disaster Risk Management*, 2015a.
- United Nations. *Sendai Framework for Disaster Risk Reduction*. 2015 Third UN World Conference on Disaster Risk Reduction (WCDRR), 2015b.
- United Nations Commission on Sustainable Development and Division for Sustainable Development. *Indicators of Sustainable Development: Framework and Methodologies*. Department for Policy Coordination and Sustainable Development, New York, 1996.
- United Nations Development Programme. *Governance for sustainable human development*. Policy Document. 1997.
- United Nations Development Programme. *Releasing Local Private Enterprise through Municipal Strategies in Poland: Interim Report*. Number Volume II in Series on The Impact of Participation in Local Governance Summary Case Studies on Decentralised Governance. 1999.
- United Nations International Strategy for Disaster Reduction. *Climate Change and Disaster Risk Reduction*. Briefing Note 01. Geneva, 2008. URL <http://eird.org/publicaciones/Climate-Change-DRR.pdf>.
- United Nations International Strategy for Disaster Reduction. *Terminology on Disaster Risk Reduction*. United Nations, Geneva, 2009.

- United Nations International Strategy for Disaster Reduction. *National Platforms for Disaster Risk Reduction in Europe: Fact Sheets of European National Platforms*. UNISDR Europe Office, 2014. URL http://www.unisdr.org/files/19617_overviewnpeuropeefdr20141211.pdf. Last visited 25 August 2016.
- United Nations Strategy for Disaster Risk reduction. *Hyogo Framework for Action 2005-2015: Building the Resilience of Nations and Communities to Disasters*. World Conference on Disaster Reduction 18-22 January 2005, Kobe, Hyogo, Japan, 2005.
- United States Environmental Protection Agency. Water resources, 2016. URL <https://www.epa.gov/learn-issues/water-resources#our-waters>. Last visited 31 August 2016.
- United States Geological Survey. *What is a watershed?* 2016. URL <http://water.usgs.gov/edu/watershed.html>. Last visited 31 August 2016.
- van Asselt, Marjolein B.A. and Renn, Ortwin. Risk governance. *Journal of Risk Research*, 14(4):431–449, 2011. ISSN 1366-9877. doi: 10.1080/13669877.2011.553730.
- Vinchon, Charlotte, Carreño, Martha-Liliana, Contreras-Mojica, Diana Maria, Kienberger, Stefan, Schneiderbauer, Stefan, Alexander, David, Barbat, Alex H., Cardona, Omar D., Decker, Bernd, Eidsvig, Unni, Papathoma-Köhle, Maria, Miniati, Roberto, Pratzler-Wanczura, Sylvia, Ulbrich, Thorsten, Vangelsten, Bjørn Vidar, and Welle, Torsten. *Assessing vulnerability to natural hazards in Europe: from principles to practice: Manual on methods and concepts*. Methods for the Improvement of Vulnerability Assessment in Europe (MOVE), 2011.
- Wagenaar, Hendrik. Interpretation and Intention in Policy Analysis. In Fischer, Frank, Miller, Gerald, and Sidney, Mara S., editors, *Handbook of public policy analysis*, volume 125 of *Public administration and public policy*, pages 429–441. CRC/Taylor & Francis, Boca Raton, 2007. ISBN 1574445618.
- Walker, Gordon, Whittle, Rebecca, Medd, Will, and Watson, Nigel. *Risk governance and natural hazards*. WP2 Report. CapHaz-Net Consortium, 2010.
- Weber, Dominique. Research into earth movements in the Barcelonnette basin. In Casale, Riccardo, Fantechi, Roberto, and Flageollet, Jean-Claude, editors, *Temporal Occurrence and Forecasting of Landslides in the European Community*, Final Report 1, pages 321–336. 1994.
- Weiss, Thomas G. Governance, good governance and global governance: Conceptual and actual challenges. *Third World Quarterly*, 21(5):795–814, 2000.

- White, Gilbert F. and Haas, J. Eugene. *Assessment of Research on Natural Hazards*. The MIT Press, Cambridge, Massachusetts, 1975.
- Yanow, Dvora. Interpretation in policy analysis: On methods and practice. *Critical Policy Studies*, 1(1):110–122, 2007. ISSN 1946-0171. doi: 10.1080/19460171.2007.9518511.
- Yin, Robert K. *Case study research: Design and methods*, volume v. 5 of *Applied social research methods series*. Sage Publications, Thousand Oaks, California, 3rd ed. edition, 2003. ISBN 9780761925538.
- Yin, Robert K. *Case study research: design and methods*. Sage, London, 2009. ISBN 1412960991.
- Young, Oran R. *The Institutional Dimensions of Environmental Change: Fit, Interplay and Scale*. The MIT Press, Cambridge, Massachusetts, 2002.

