EDUCEN

City - Culture - Catastrophe

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Overview and key messages

1. Culture is a critical driver of risk perception, vulnerability, and resilience. Yet the multiple roles that culture may play as an asset or obstacle in disaster risk reduction have so far not been explored and set out. In this extensive literature study **we have discovered that there is a lack of compelling exemplary stories of culture in disaster risk reduction in European cities**. Most studies that triggered our attention for 'culture' and 'disaster' either (a) provided non-European examples (b) described disasters in rural areas (c) focused predominantly on the protection of physical cultural heritage or (d) were to a large extent historical in their content. Due to this lack of contemporary cases in European cities, the current report builds on cases from outside of Europe as well. These cases may provide indications for further investigation or discussion in the EDUCEN project.
2. The current report is divided in three parts. **The first part provides a conceptual background, introducing several topics that come to light when considering 'culture' in 'disaster risk reduction'**, amongst others (a) risk perception (b) disaster (sub)cultures (c) religion (d) gender (e) vulnerability and (f) resilience. **In the second part we dive into the key topics that EDUCEN sets out to examine**, including the role that cultural memory, physical city infrastructure, the social composition of the city, cultural and social networks, and disaster and emergency management organisations play in disaster risk reduction. **In the third part of the report we set out the current state of integration of culture in disaster risk reduction** in EDUCEN's case study cities, as well as in existing EU and international projects and policies. In addition, **part three of the report discusses existing policy- and analysis tools, and shows how games can be used to enhance a culture of safety and resilience**. Furthermore, a glossary and key reference list are attached as annex to this report.
3. Chapter one provides a **working definition for culture**. The definition covers people's values, beliefs and perception, as well as behaviour, that are continuously in the making. It is a combination of a classic definition of culture with other definitions that stress that 'culture contains meaning' and that 'culture is learned'. The chapter provides a working definition for 'disaster' as well.
4. Chapter two elaborates on some of the key discussions in the literature relating to culture and disaster. Amongst others, the concepts of vulnerability and resilience are examined. It is found that **despite the impact of cultural factors on both people's vulnerability and resilience, culture is almost completely ignored as part of these processes**.
5. **Previous experience** with a hazard event, **personal characteristics** such as age, gender, religion, educational level, economic factors such as home ownership, **and trust** in scientific experts and authorities **may influence risk perception of natural hazards** but this is highly context specific and research findings are not conclusive.
6. **People use their own cultural and historical explanations to, amongst others, minimize their fears.** Amongst other cases, the case of Iceland is used to discuss (volcanic) risk perception. Here many residents believed that the volcano is no longer active, possibly being a challenge for authorities that spread risk information. Coping mechanisms such as place attachment, cognitive dissonance, and fatalism are discussed that allow people to adapt to living under risk without experiencing much emotional distress. **Understanding**

risk perceptions and coping strategies is crucial for effective disaster management.

7. Experience with disaster and the adjustments and adaptations people have made in their lives and livelihoods may give rise to particular **disaster subcultures** that encompass specific ideational and behavioural characteristics and adjustments to living in hazard prone areas. Chapter three elaborates on the key conditions for a community to start cultivating a disaster subculture.
8. Chapter four discusses the **multifaceted and distinct local roles that religious institutions play in disaster risk reduction**. Religion influences risk perception and the explanation of disasters. Both the leadership roles of clergy and the historical experience of the church in charitable works can be integrated into effective programmes of disaster relief.
9. Chapter five discusses the nexus between **gender and disaster**. It asserts that a gender-specific approach is increasingly seen as essential for effective disaster management. Apart from defining the key notion of gender, the chapter provides a number of instruments and toolkits to engender disaster management.
10. Chapter six discusses **the particular characteristics of the urban situation for disaster studies.** The complex infrastructural and administrative systems, the often dense and heterogeneous population and the fact that cities are subject of rapid change lead to particular urban vulnerabilities to disaster.
11. The second part of the report starts with a chapter on **cultural memory**. Chapter seven emphasizes **the importance of documenting disasters** and extreme events. Memorials for example are well suited to recall the memory of historical events and safeguard against the same devastating impact if disaster recurs. **When remembered, memorialised and compared, experiences of disasters may inspire the invention of social practices and techniques in dealing with catastrophes.**
12. Human behaviour can be influenced by existing urban structures, urban planning and nature. This is elaborated in chapter eight that touches upon the cities of Barcelona, Lisbon, New Orleans, Dordrecht and Kobe. This chapter zooms in on **cultural heritage**, both material and non-material, and on the **effects of the structural pattern of a city** (grid- or organic pattern, density or open areas, height of buildings, accessibility etc.) **on a crisis situation**.
13. **Chapter nine brings to life the concept of social vulnerability** by exploring what factors make low-income households, immigrants, and people with a disability more susceptible to the impact of hazards. The case of New Orleans is discussed, where a combination of racial segregation, poverty and geographical location led to one of the worst disasters in American history. In addition, the chapter focuses on **the little acknowledgement of people's heterogeneity** by for example discussing the **position of people with a disability** in different disaster phases. Furthermore, the chapter highlights **the position of (illegal) immigrants in disaster settings** and particular vulnerabilities related to this group.
14. Chapter ten elaborates on definitions and measurement of social capital. Here **the role that social capital and social networks plays in the context of vulnerability, resilience, and disaster management are discussed**. Examples from Italy, the UK, and France are used to highlight for example the role of trust in authorities – and how this may change – and innovative information sharing techniques such as social media.
15. Chapter eleven introduces the **many actors engaged in disaster risk- and emergency management** and examines cultural challenges in the interaction between different

stakeholders in disaster management, and between these stakeholders and communities.

16. Chapter twelve sets out the current knowledge on the integration of culture in disaster risk reduction, and delves into current and past projects related to this topic on the European and international level. It resulted from the enquiry that **three out of the six case study cities that responded could not identify projects linked to culture and disasters in their cities**. In addition, **five main relevant projects at European level have been identified**, four within the FP7 and one in H2020**, yet they focus on topics such as resilience and lack an explicit cultural component**. On the international level the ***Hyogo Framework for Action*** **and the** ***Sendai Framework for Disaster Risk Reduction*** were identified as relevant for the EDUCEN project.
17. Chapter thirteen discusses **the potential of Social Network Analysis tools when integrated into disaster risk management policy and practices**. At the same time different barriers hamper this introduction, a topic discussed as well in this chapter.
18. High costs of gathering data related to how various members of society actually think and decide often hamper the efforts to work with an disaster risk management method that values the diverse social and cultural urban setting. This is where **policy exercises and serious games may play a crucial role**. Through the help of a mediator or trainer, simple material, and people who play the position that they normally are in, or people who position themselves in the minds of others, **games can bring added value to the methods already used by trainers and planners**. Yet, the **ethics for running games and simulations should not be forgotten**, and hence are discussed as well in chapter thirteen. **Simple and efficient exercises, games, and simulations to improve disaster risk preparedness and response are provided in annex X**.

Introduction

Culture is a critical, yet overlooked, driver of risk, vulnerability and resilience. Communities, whether or not tied to particular places, are key resources in both proactive and reactive phases of emergency management. A lack of consideration of the role of culture can constrain risk management options. Neglecting the presence of different social networks in cities, and how these networks perceive and interpret risks differently, could lead to real or preceived differences and conflicts or miscommunication that hamper the effectiveness of disaster risk reduction actions.

Therefore the current report aims to firstly, understand and describe, amongst others, notions of 'culture', 'disaster' and 'vulnerability', secondly, extract from the existing literature exemplary stories of culture in disaster risk reduction and –response and thirdly, describe known existing projects and tools related to culture in disaster risk reduction. The current document is a 'living document' intended for interaction with case cities, and hence it is an initial evaluation of a 'where do we stand now?' position for the EDUCEN project.

The document is divided in three parts. The first part is a conceptual part comprising six chapters.

Chapter **one** provides an overview of definitions of main concepts in the EDUCEN project
Chapter **two** provides an overview of the key topics discussed in the field of culture and disaster
Chapter **three** elaborates on the notion of disaster subcultures
Chapter **four** zooms in on the specificity of cities in a disaster context. After discussing the different situation that cities find themselves in compared to rural areas and the difficulties in defining an 'urban disaster', the chapter discusses the role of power.
Chapter **five** discusses the role of gender in disaster and disaster management.
Chapter **six** deals with disasters in an urban setting and the particular challenges this provides.

The second part of the document attempts to describe in more detail the topics that the EDUCEN project may focus on. It consists of four chapters.

Chapter **seven** discusses the physical context of the city that influences how disasters are handled and can be dealt with, and that at the same time is often culturally created based on past disaster experiences.
Next to the vital physical infrastructure then, chapter **eight** focusses on the role of social infrastructure in disaster risk reduction, that is less tangible and therefore more complex to grasp, appreciate and investigate. The social infrastructure refers to (sub)cultures and socio-cultural networks and their constantly evolving social practices.
Of particular importance within communities are the social capital resources that may work to improve a community's resilience (Murphy 2007). In chapter **nine** therefore, the focus lies on social networks. Social networks provide the channels whereby individuals develop a

perception of risk and can be motivated to take reactive actions. Since social networks also employ new and innovative ICTs these are discussed in chapter nine as well.
Chapter **ten** discusses disaster and emergency management focusing on the different stakeholders and their differences, including the military as a separate group that may be called upon to assist the civilian authorities.

Part 3 deals with policies, projects and tools.

Chapter **eleven** discusses how culture is integrated in the different case study areas of the EDUCEN project. It also discusses several other projects and policy tools relevant to EDUCEN at the European and international level.
Chapter **twelve** outlines the nature and potential contribution to disaster management of Social Network Analysis tools.
Chapter **thirteen** finally presents relevant games and simulations, while also elaborating on some ethical and legal issues involved in their use.

Each part of this report concludes with a short summary. The reports also includes a list of references and ten annexes that provide key definitions, key literature, projects, tools and exercises in the field of cluture and disaster.

As indicated above, the report is a living document, that will be regularly updated, adjusted or complemented when new insights or experiences present themselves during the course of the EDUCEN project.

Part I: Conceptual introduction to Culture and Disaster

1. Culture and disaster

This section provides an introduction to the concepts of culture and disaster.

1.1 Understanding of culture and working definition

The word "culture" is so all - embracing that it is very hard to define. Nevertheless, it has been one of the most useful conceptual tools for explaining many regularities in human behavior (Alexander 1991). The classic definition of the concept of culture was given by Tylor (1871) who describes culture as 'that complex whole which includes knowledge, belief, art, morals, law, custom and any other capabilities and habits acquired by man as a member of society'. To Inglis and Hughson, culture is manifested in artefacts and symbols and is learned. Culture contains meaning, they argue, and "these meanings are the ways through which people in the group comprehend, make sense of, and respond intellectually and emotionally to the world around them" (2003: 6). Giving a more broad understanding of culture, Hofstede's definition is: "Culture is the collective programming of the mind that distinguishes the members of one group or category of people from others" (2001). In essence, Alexander argues, culture consists of the summation of beliefs and behavioral patterns, the imprint of history and the force of achievements of a particular people. The resulting cultural systems are both the fruit of past actions and a strong conditioner of future ones (Alexander 1991b). Culture is thus continuously in the making (Engel et al. 2014) and not a unified system that pushes action in a consistent direction (Swidler 1986).

The difficulty in offering a single definition for culture is that the term is used to represent many different aspects of society, its creations, and its interactions. It also risks being incomplete in not encompassing the complexities and diversity of the term (Hewitt 2012, Thomalla et al. 2015). Illustrations of such complexities are given by Alexander (1991), explaining that the individual is usually conditioned by many more influences than merely his or her culture of origin. Moreover, individuals can migrate between culture and absorb new cultures, he states, and cultures are dynamic phenomena that can change, sometimes rapidly (Alexander 1991). It is therefore important to recognize that culture is no static and fixed entity (Said 1989, Waring 1992, Rozakis 2007). People are not passive recipients of an entity called culture. Rather, they play an active role in making and remaking culture. In other words, culture functions as a "tool-kit'' or repertoire of habits, skills, and styles that people can use to construct "strategies of action'' (Hannertz 1969, Swidler 1986) but these are merely suggestions that people can select from, adapt, ignore, or reject. In addition, culture changes continually by ordinary individuals constructing and externalizing new meanings (Ratner 2000).

Subculture

It is widely acknowledged that cultures are not homogeneous but encompass a myriad of subcultures. The term 'subculture' was introduced in the early 1940s to indicate the internal

heterogeneity of (sub)[2]societies (Engel et al. 2014). The concept of subculture refers to identifiable variations in the more general and pervasive cultural themes and patterns that characterize a given society (Anderson 1965). Subcultures exist when certain groups of people share distinctive cultural characteristics which sets them off, or differentiates them, from other groups. Like cultures, subcultures encompass physical and visible components (artifacts and behaviors) and 'ideational' components (values and norms). Furthermore, subcultures are dynamic as a result of their members continuously interacting with others in society (Fine and Kleinman 1979, Engel et al. 2014).

The term culture is used for tribes or ethnic groups (in anthropology), for nations (in political science, sociology and management), and for organizations (in sociology and management) and is furthermore applied to the genders, to generations, or to social classes (Hofstede 2001). However, it is important to note here that subculture should not be equated to subsociety. As explained in the work of Fine and Kleinman, subculture has often been treated as synonymous with the population comprising the subsociety (1979). "Subculture is then treated as a membership category in which the criteria for belonging is structural (e.g. Valentine 1968) or network based (e.g Cloward and Ohlin 1960) rather than dependent on a system of beliefs and practices'' (Fine and Kleinman 1979: 2). For example, if we look at age for example, according to a "structural'' conceptualization, all individuals in the age category 13-21 might be considered part of the youth subculture. However, it is clear that not all persons within that age cohort share the same cultural values and behaviors. Additionally, there might be others that share the same "youthful'' values that might not fall in the age category of youth. Since there is or can be a difference in membership between a subsociety as defined purely structurally and those who adopt the values and behavior of a subculture, Fine and Kleinman argue that it is necessary to distinguish between subculture and subsociety (ibid).

Working definition of culture

Despite the variety of definitions of the concept of culture, several aspects are commonly included. In their work on the cultural aspects of risk to environmental changes and hazards, Thomalla et al. (2015) provide an overview of five aspects of culture they identified in the literature.

Aspects of culture	Elements
Practice/Behavior	Tradition; customs and norms; social behavior; rituals; livelihoods
Manifestations/ Products of a culture	Arts and artifacts; rules and laws; tools and technology; communication (language, written and oral history); ideas
Beliefs/ Values/ Worldviews	Beliefs (religion, spirituality, fatalism); attitudes; assumptions; worldviews; values

[2] Own addition

	(attachment to place)
Knowledge	Indigenous knowledge; traditional knowledge; local knowledge; scientific knowledge; education
Social structure	Social control and power; social networks; relationships social organization; agency; social capital; belonging

Table 1: Aspects of culture and related elements. Adapted from Thomalla et al (2015: 8-9)

EDUCEN aims to investigate the influence of cultural aspects on how different people may perceive a risky situation and act/react according to this perception. A working definition of culture that includes values, beliefs and perception, as well as behavior is therefore most suited for the project. The EDUCEN definition combines (aspects of) the classic definition of culture of Tylor (1981), the definition of Swidler (1986) and Hannertz (1969) focused on action, the more contemporary definition suggested by Inglis and Hughson (2003) which includes the importance of "meaning'', and the aspects of culture identified by Thomalla et al (2015). For EDUCEN culture entails:

The (learned)knowledge, beliefs, values, art, rules and law, customs and norms, and social structure that people use to comprehend and give meaning to the world around them, and which together form the "tool-kit'' or repertoire of habits, skills, and styles from which people construct "strategies of action''

Important to note here is that individuals are not passive recipients of culture but rather active participants that create and give meaning to culture. People can select certain aspects of culture, whilst rejecting others, to construct ''strategies of action''.

1.2 Understandings of disaster and working definition

Hazard versus disaster

The problem of how to define disaster has been the subject of considerable debate in various disciplines (Alexander 2000). First, the distinction between hazards and disasters requires explanation. A hazard is an extreme geophysical event or the potentially dangerous product of some human activity. According to Smith, hazards may best be defined as: *"a potential threat to humans and their welfare arising from a dangerous phenomenon or substance that may cause loss of life, injury, property damages and other community losses or damage''* (Smith 2013: 11).

A distinction can be made between hazards that are unrelated to human activity and those that are. Alexander's (2000) distinction between natural, technological, and social hazards is helpful in this regard. According to him, natural hazards are extreme events that originate in the biosphere, lithosphere, hydrosphere or atmosphere. Technological hazards include

explosions, releases of toxic materials, episodes of contamination, structural collapses, and transportation, construction and manufacturing accidents. Examples of social hazards are crowd crushes, riots and terrorist incidents. Table 2 provides an overview. The category of biological hazards is added to Alexander's distinction, including epidemics affecting human and or animals. Such epidemics may also be the consequence of other hazards, such as earthquakes, storms, or droughts (IFRC). A further distinction is made between rapid onset disasters, that unfold almost instantly, and slow onset disasters which can be predicted further in advance and unfold over months or even years. Slow onset natural disasters are also referred to as ''creeping disasters'' as their effects are not immediately felt.

	Natural	Technological	Social	Biological
Rapid onset	Earthquakes Volcanic eruptions Tropical storms Bush fires	Explosions Release of toxic materials	Terrorist incidents Crowd crushes Riots	Epidemics; avian flu, ebola, yellow fever
Slow onset	Drought Environmental degradation Climate change	Contamination	Conflict War	HIV/AIDS

Table 2: A typology of hazards

However, as argued by Hewitt (1997), very little is natural about phenomena in which the danger results largely from human decision making, land use, environmental management, and socio-economic activities. Many would therefore argue that "natural'' hazard is a misleading term.

What constitutes a disaster?

While a hazard is a potential threat, a disaster refers to the combination of a hazard and human vulnerabilities. Unless hazards or extreme events affect people, they are simply natural occurrences without social significance (Hague and Etkin 2007).

So what constitutes a disaster? Most scholars agree that the critical ingredient for a disaster is the victims (Torrence and Grattan (eds) 2002) but beyond this point the details vary. Some scholars, for example Tobin and Montz (1997) use a specific number of deaths as a threshold for a disaster. Others, such as Oliver-Smith, focus on the amount of damage caused by a disaster, requiring that 'the essential functions of the society are interrupted or destroyed' (1996: 305). The key factor in again other definitions is the response. Blaikie et al. (1994) for example define a disaster as a situation where 'recovery is unlikely without external aid' and the definition of Tobin and Montz requires for a situation to be defined as a disaster that 'the damage may be so great and so extensive that survivors have nowhere to turn for help' (1997:

31). The definition of UNISDR combines elements of the above definitions by regarding something a disaster if it leads to 'a serious disruption of the functioning of a community or society causing widespread human, material, economic or environmental losses, which exceed the ability of the affected community or society to cope using its own resources' (UNISDR 2009: 13).

In the traditional view of hazards, it is implied that the physical hazard causes the human disaster (Alexander 2000). This view suggests that the root cause of death and destruction lies in the natural domain and that solutions and measures to disasters can be sought in technological interventions and control of the physical environment (Hague and Etkin 2007, Gaillard et al. 2008). Whereas this idea has long been dominant (also within the United Nations and the World Bank), criticisms have appeared in the literature and there has been a shift in thinking. It is now widely recognized that natural disasters are the result of the complex interaction between extreme geophysical events and the human communities affected by them (Hewitt 1983, Oliver-Smith 1999, Quarantelli 1995, Felgentreff and Glade 2008, Riede 2015). According to McEntire, "any disaster is a combination of a triggering agent and a set of vulnerabilities – and it is these vulnerabilities, the conditions, which affect the capacity of a society to respond to the triggering agent which is the controllable component of a disaster'' (2001: 189). This argument is also put forward by Oliver-Smith, who states that "an earthquake as a feature of nature may represent a universal and timeless challenge to human welfare, but it becomes a disaster only in the context of a specific society and a characteristic pattern of vulnerability (…)'' (2003: 17-20). The concept of vulnerability will be discussed in more detail in the next chapter.

Working definition of disaster

How disasters are explained depends on the discipline in which they have been defined. The works of Quarantelli (ed), 'What is a disaster. A dozen perspectives on the question' (1998) and Perry and Quarantelli (eds) 'What is a disaster? New answers to an old question' (2005), provide an interesting overview of the variety of disaster definitions amongst academic disciplines. Nevertheless, there are several common denominators found in the literature on disaster definitions. For example, almost all the definitions describe a disaster as an event, which disturbs the social structure or the environment, causes a significant loss (and needs external assistance in recovery) (Ginige et al. 2009). In their attempt to harmonize definitions of disaster, Maynor and Arbon (2015) identified no less than 128 different disaster definitions. Based on these definitions they present a computer generated definition for the word disaster: 'the widespread disruption and damage to a community that exceeds its ability to cope and overwhelms its resources.' In contrast to similar definitions, the need for outside assistance appears to be implicit and was not included in the current definition (Maynor and Arbon 2015). Interestingly, this definition is largely similar to the UNISDR definition. As the UNISDR definition is widely accepted and fits the purpose of the EDUCEN project, a disaster is defined as:

"a serious disruption of the functioning of a community or a society causing widespread

human, material, economic, or environmental losses which exceed the ability of the affected community or society to cope using its own resources.'' (UNISDR 2004: 17).

2. Overview of key topics identified in literature on culture and disaster

This section discusses the key topics debated in the literature on culture and disaster. Some topics are of conceptual nature, such as the discussion on vulnerability and resilience. Others have been discussed from a more practical point of view such as the topic of risk perception. The chapter intends to provide an overview of the themes most relevant to the EDUCEN project. It is found that although culture has been recognized as important to understanding the significance and role of disaster in the modern world (see for example Alexander 2012, Cannon 2015), it is largely ignored in key discussions on concepts such as vulnerability and resilience.

2.1 Vulnerability

We have already used the term vulnerability several times. Being one of the most used concepts in the literature on culture and disaster, it also deserves attention on its own. The vulnerability perspective followed from the reconsideration of seeing the effects of hazards as determined by the social context and power relations, rather than just by natural forces, as discussed in previous sections of this literature review.

Vulnerability has been conceptualized in many ways depending on various research disciplines, but it is developed largely in those social sciences addressing environmental risks and hazards (Kasperson and Kasperson 2005). A working definition is provided by Wisner et al who consider vulnerability as “the characteristics of a person or group and their situation that influence their capacity to anticipate, cope with, resist, and recover from the impact of a natural hazard’’ (Wisner et al. 2003: 11). It involves a combination of factors that determine to what extent people, their livelihood, property, or other assets are put at risk by events, or series of events, in nature and society, they argue (ibid).

Inherent in the approach is that risks are different for everyone, even if they face the same hazard. Vulnerable populations are those at risk not simple because they are exposed to hazard but because they cannot absorb its impact as a result of marginality. Taking into account people and the differences among them (Bradshaw 2004), vulnerability is a key concept in predicting and understanding the existence of differentiated impacts of a natural disaster on the various groups in a society. The pressure-and release (PAR) model developed by Blaikie et al (1994) proves a helpful model to understand what makes people vulnerable to hazards.

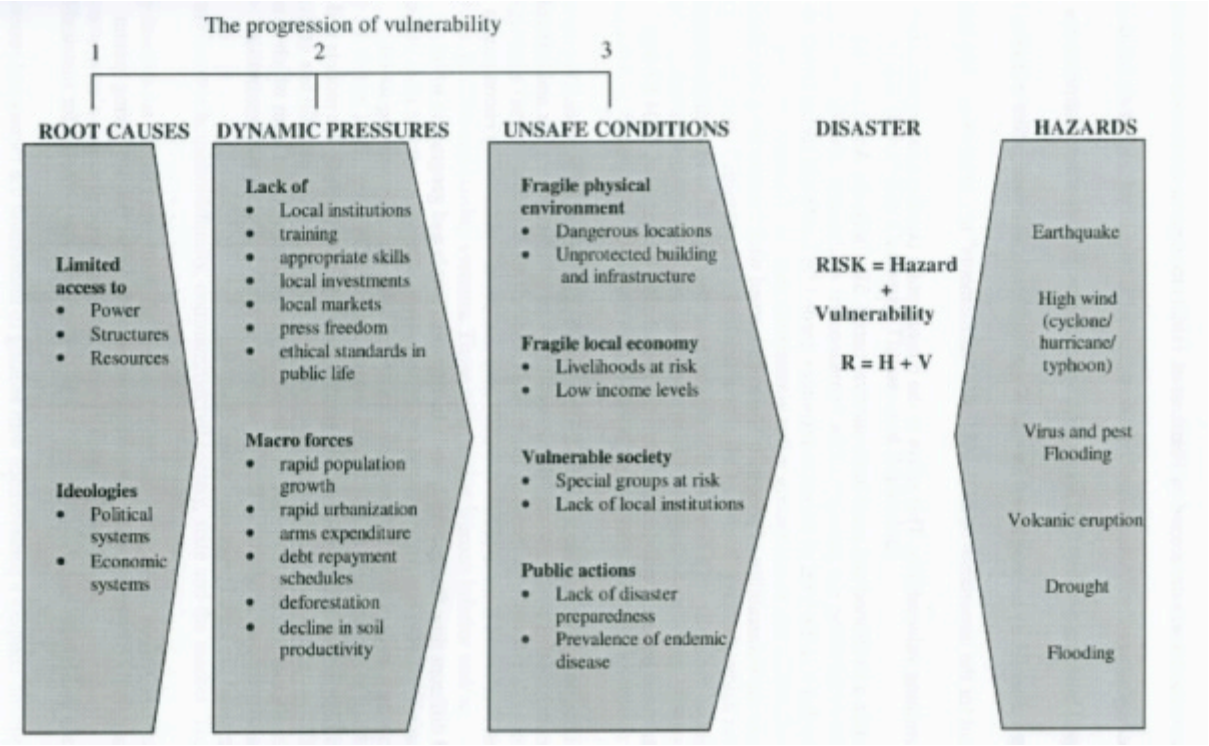

Figure 1: Pressure and Release model: the progression of vulnerability (Blaikie et al. 1994)

The PAR model is based on the idea that an explanation for disasters requires taking into account the connections that link the impact of a hazard on people with a series of social factors and processes that generate vulnerability. Wisner et al. identify three sets of links that connect the disaster to the people impacted by the disaster.

- Root causes: an interrelated set of widespread and general processes within a society and the world economy. The most important rout causes for vulnerability are social, economic, demographic and political processes which affect the allocation and distribution of resources among different groups of people.
- Dynamic pressures: processes and activities that 'translate' the effects of root causes both temporally and spatially into unsafe conditions.
- Unsafe conditions: the specific forms in which the vulnerability of a population is expressed in time and space in combination with a hazard. Examples are people that have to live in hazardous areas, being unable to afford safe buildings, lacking effective protection by the state, having to engage in dangerous livelihoods, or having minimal food entitlements.

  (Wisner et al 2003: 52-56)

It is important to realize that there are many ways in which dynamic processes channel root causes into unsafe conditions and that this is not simply a matter of cause and effect.

Criticism

The concept of vulnerability has been subject of criticism. The vulnerability approach is for example often criticized for its view of people as passive victims. Other criticism relates to the lack of culture in the social construction approach to vulnerability. The social construction approach as illustrated above explains the disastrous effects of a hazard by various processes and factors that generate vulnerability. Culture however is almost completely ignored as part of this process, despite its great significance in making people vulnerable. While the economic and political processes that generate vulnerability have been fairly well understood and integrated in vulnerability analysis, there is a significant gap relating to culture, Cannon argues (2015). The factors normally taken into account in most versions of social construction are of economic, social and sometimes political origin. They are however rarely framed in relation to culture. Social factors are sometimes analysed in relation to culture and vulnerability but rarely in depth. For example, the issue of significant gender difference in disaster mortality has been subject of academic discussions on cultural factors. However, gender issues are not often included as a *cultural* vulnerability factor, rather, they are perceived as an issue of rights or inequality. Furthermore, specific vulnerabilies of groups such as children, elderly people, or people with a disability, focus on their vulnerability as being group-specific rather than being culturally constructed.

2.2 Resilience

The term vulnerability is used for those most at risk. As Wisner et al. (2003) explain, "when we talk of vulnerable people, it is clear that we mean those who are at the 'worse' end of the spectrum''. Contrary to the concept of vulnerability, resilience starts from people's own capabilities and potential. The word resilience is derived from the Latin word resilio, meaning "to jump back'' (Klein et al. 2003). The concept of resilience has quickly gained popularity in the field of disaster studies and emergency management as an effective and efficient way to reduce prevailing vulnerabilities and thereby the risk of disaster (Engel et al. 2014).[3]

The review of Keck and Sakdapolrak (2013) of literature published on resilience provides insight into a variety of definitions. Keck and Sakdapolrak found that all definitions of resilience have in common that they are concerned with social entities –individuals, organizations, or communities-, and their abilities or capacities to tolerate, absorb, cope with and adjust to various kinds of environmental and social threats. Based on their exploration of the literature, the authors propose to define (social) resilience as being comprised of three dimensions:

[3] The concept of resilience has also gained attention from (I)NGO's and international efforts such as the Hyogo World Conference on Disaster Reduction held in 2005 in Kobe. It plays for example a vital role in the Hyogo Framework for Action where building resilient communities to disasters is considered key to disaster risk reduction.

1. Coping capacities; the ability of social actors to cope with and overcome all kinds of adversities
2. Adaptive capacities; their ability to learn from past experiences and adjust themselves to future challenges in their everyday lives
3. Transformative capacities; their ability to craft sets of institutions that foster individual welfare and sustainable societal robustness towards future crises
   (Keck and Sakdapolrak 2013: 5)

In the literature, two interpretations of resilience can be distinguished:

- Resilience as an outcome expressed in relation to vulnerability and in particular as the flip-side of vulnerability
- Resilience as a process of self-organization and self-change in an attempt to retain essential functions or structure under circumstances of whatever stress or perturbation

In the first interpretation resilience is understood as the flip-side of resilience and vulnerability and resilience are perceived as opposite to each other. In this view, mitigation actions to decrease the level of vulnerability contribute directly to improved resilience (Sapountzaki 2011). In process-related definitions, vulnerability and resilience are different concepts but linked with each other or mutually interacting. In this interpretation the role of learning capacity and decision processes is emphasized. The process-related interpretation furthermore stresses that it is not inevitable that resilience processes lead to an outcome, which is the opposite of vulnerability (Linley and Joseph 2004, Paton 2008 in Sapountzaki 2011) and that the absence of vulnerability does not make one resilient.

The resilience approach is said to hold several advantages over the concept of vulnerability. As argued by Engel et al, the resilience approach moves beyond the vulnerability and victimization discourse toward agency and capacity (see Hewitt 1995 and Bankoff et al. 2004) and from short-term coping toward longer-term adaptation and innovation. Furthermore, Engel et al argue, the resilience approach inspires a 'can-do' attitude by emphasizing a communities' capacity to overcome the impact of a hazardous event, and recognizing communities as active problem-solving agents (Engel et al. 2014) rather than passive victims.

Criticism

Although the resilience approach holds advantages over the concept of vulnerability, it has received criticism as well. One of the criticisms with regard to the concept of resilience relates to the fact that resilience might mean different things to different people and might create more confusion than enlightenment (Warner and Grunewald 2012). The dimensions of resilience discussed above (coping, adaptive and transforming capacities) are undoubtedly culture specific. This entails that resilience might mean different things to different people and the way resilience is created might also differ as different elements in a culture contribute to resilience according to how important that specific factor is in each culture (Gunnestad 2006).

Culture can have both positive and negative impacts on resilience. As explained in the section on vulnerability, cultural issues related to economic, political, and social dimensions in society might increase or reduce resilience of people. Any attempt to explore resilience in a particular community will therefore have to feature culture.

Furthermore, understandings of resilience as the capacity to absorb shocks and 'bounce back' focus on returning to ''normal'' without questioning what normality entails. A striking example of the potential undesirability of the ''normal'' can be found in the case of hurricane Katrina which not only destroyed the physical fabric of New Orleans, but also revealed social processes which many people did not perceive as the acceptable, pre-disaster normal to which they wanted to return (Davoudi 2012).

2.3 Risk perception

Hazard risk is an extensively discussed issue in many social and scientific contexts. Risk, as argued by Oliver-Smith, is problematic in that it is understood differently by various parties. Traditionally, risk is recognized by engineers, health physicists, statisticians, and epidemiologists as determined scientifically and objectively, assuming that "perceived'' risk by the public is uninformed, false, or irrational (Oliver-Smith 1996). In contrast, anthropologists have emphasized and conceptualized risk in its sociocultural context. Douglas and Wildavsky for example view risk perception as primarily a sociocultural phenomenon that is affected by social organization and values that guide behavior and influence judgements about what is considered "dangerous'' (Douglas and Wildavsky 1982).

The EDUCEN project adopts the understanding of risk of Douglas and Wildavsky, valuing risk perception as a sociocultural phenomenon. Perceptions of risk are embedded in culture. As noted by Douglas and Wildavsky (1982), the cultural belief system determines the collective notions of how the world functions. These collective notions also contain social constructed ''images'' of the world, including perceptions on what is dangerous and how to cope with risk. Individual aspects of risk perception are influenced by the social community that people live in and vice versa. The cultural context is also interrelated to individual perception as well as to the social system. This social knowledge is essential for the members of a society to evaluate situations and act in an appropriate manner. Consequently, understanding the ways risks are dealt with requires a thorough understanding of the cultural setting.

Inherent in such an understanding is the recognition that these risk perceptions often rely on intuitive risk judgement or beliefs rather than on rational deliberations, and therefore may differ considerably from risk assessments by experts of the same event. As Alexander argues, "decisions about whether to mitigate a natural hazard are often not a function of how dangerous the hazard is in absolute or objective terms but how dangerous it is perceived to be'' (2000: 73). Studies on risk perception can give disaster managers a better understanding of people's attitude towards risk and consequent behavior and thereby add important knowledge to disaster management.

The determinants of risk perception have been extensively discussed in the literature and several influential factors have been identified.[4] The first factor frequently noted as shaping risk perception of natural hazards is previous experience with a hazard event. The importance of previous hazard experience as predictor for risk perception has been emphasized by a number of researchers (for example Bezuyen et al 1998, Siegrist and Gutscher 2008, Terpstra 2009). However, while risk perception and risk awareness reach high levels directly after a hazard, they fade away over time (Renn et al. 2015, de Dominics et al. 2015). Moreover, experience with natural hazards does not always lead to heightened risk perception, as illustrated in the following case:

Box 1: Links between previous experience and perception of flood risk in Germany

In the case study of Kuhlicke et al on the Mulde river in Germany, no one seemed to have anticipated that the river could rise as high as it did in 2002. Most people had previous experience with floods but because they thought they understood the river and its variations, they could not envisage the 2002 flood (Kuhlicke et al. 2011). Previous experience with hazards, in this case, led to inaccurate perceptions of risk.

Other research explored the significance of personal characteristics such as age, gender, educational level, and economic factors such as home ownership, on risk perception levels. Apart from a few exceptions (Ruin et al. 2007, Miceli et al. 2008), most studies did not find any age-dependency (Renn et al 2010). A number of studies found that women seem to take risk more seriously than men (Fothergill 1996, Bateman and Edwards 2002, Miceli et al. 2008). Some research revealed that low-income individuals have greater risk perceptions. The work of Flynn et al. (1994) and Fothergill and Peek (2004) for example shows that socio-economic status is a significant predictor in both pre- and post-disaster stages. However, other research (for example West and Orr 2007) found that there is no relationship between disaster perceptions and measures of economic vulnerability such as family income, having private transportation, and renting versus owning a home or apartment (West and Orr 2007). In general, personal characteristics and socio-economic variables seem to have generated mixed results.

A third factor frequently mentioned in the literature on risk perception is trust. Several studies consider trust in scientific experts and authorities and confidence in protective measures to be an important factor for the risk perception of natural hazards. Renn et al for example found that the lower respondent's feeling of danger related to hydrological phenomena the higher their trust in local authorities (Wachinger et al. 2013, Renn et al. 2015). Similarly, the results of Cornia et al.'s (2014) research on risk cultures in seven European countries illustrate that respondents in Germany, Austria, the Netherlands and Sweden feel they live in a safe place

[4] The factors explored in this section have been identified in the studies included in this literature review. It is by no means an attempt to provide a non-exhaustive exploration of all factors of influence on risk perception

because they trust the public authorities to deal with disasters and take preventive measures. Trust and delegating responsibility to authorities can lessen perceptions of flood likelihood and magnitude, resulting in the paradoxical effect of decreasing risk awareness and consequent adaptation of behaviour.

2.4 Adjusting to living in hazardous areas

Why do people live in dangerous areas when they are aware of the risks? Several reasons for continuing to live in risky areas are revealed in the literature. First, in some cases, people's livelihood is bound up with the specific location. Livelihoods are often better in danger zones: flood-plain and volcanic soils are fertile, and coasts are good for fishing and farming. Moving would lead to significant uncertainty on what they could do for a living. People thus exchange the benefits of their livelihoods with the risk of the hazards that can affect them (IFRC World Disasters Report 2014). Second, the perception of hazards and disasters should not be viewed in isolation from competing demands on people's attention from other events. People struggling with day to day survival and daily problems of crime or unemployment, may have other things on their minds than disaster mitigation strategies. The scale and accuracy of hazard perception may depend on the extent to which lives and resources are at risk and the context of social problems in the community, as Alexander argues (2000).

Cultural dimensions such as religion and place attachment play a significant role in enabling people to live with risks, as will be illustrated below.

Fatalism

Research by Oral et al. (2015) on earthquake experience and preparedness in Turkey found that whilst people had experienced an earthquake with great losses, they were still minimally prepared for the next one. Their research participants explained their ill-preparedness by stating that an earthquake is uncontrollable and referred to it as an act of God. Therefore, they argued, there is no point in preparing for another earthquake. Research by Cornia et al. (2014) on risk cultures and dominant approaches towards disaster in European countries also revealed fatalistic attitudes in Italy, Hungary, and partly, in the research findings from French. Resignation to fate, or the believe that events are predetermined and caused by external, often supranatural, forces (such as fate, God, nature) plays a significant role in coping with the danger of disasters caused by natural hazards.

Place attachment

Research by de Dominics et al (2015) illustrates the role of place attachment -the positive association between individuals and their residential environment- also plays a role in decisions of people to live in a hazardous place. Factors such as genealogy, religion, social-,

physical-, and economic attachment, may be strong motivators to keep residing in an area even it if is considered dangerous (Mishra et al. 2010). Moreover, the 2015 research findings of de Dominics et al illustrate how place attachment, given its connection with one's place and social identity, may act as an automatic defense mechanism to natural hazards. Place attachment, de Dominics et al explain, may function as a negative moderating variable on preventive behaviors when related to natural hazard risk perception. This restraining effect may provide some sort of automatic shield for protecting one's one place and social identity from the threat represented by the environmental risk. Trough a sense of identification with a particular location, people can maintain emotional continuity in their lives (IFRC World Disasters Report 2014). Culture and psychology are thus powerful factors that make people live with exposure to hazards. Such a willingness to accept risk is observed in a wide range of countries, people and income groups, including many poorer people.

Cognitive dissonance

The literature on coping with life in disaster prone areas exposes several coping mechanisms to reduce or eliminate psychological distress. One such coping mechanism is cognitive dissonance, in which an individual perceives his environment to be hazardous but continues to live in it. The term is used to describe the emotional stress that people suffer when they are forced to live with two contradictory ideas. Cognitive dissonance can occur when people experience a clash, -a dissonance-, in their mind that upsets them. People living and gaining their livelihood from a hazardous area have to cope mentally with the fact that they live with the possibility of disaster. "When dissonance is present, in addition to trying to reduce it, the person will actively avoid situations and information which would likely increase the dissonance'' (Festinger 1957 in IFRC World Disaster Report 2014). This implies that information about the hazard may be ignored because it would increase the stress of the dissonance. Instead, people use their own cultural and historical explanations to minimize their fears, as illustrated in the case below.

Box 2: Cognitive dissonance, vulnerability, and volcanic risk perception in Iceland

Research by Johannesdottir and Gisladottir (2010) on vulnerability and risk perception of residents living in the proximity of volcano Katla shows that people have good knowledge about previous eruptions and evacuation plans, but have not taken measures to personally mitigate the effects or prepare for a future eruption. When people in the proximity of Katla mention the volcano, they often refer to a prophet who predicted that the volcano would stop erupting. Additionally, seasonal activity in Katla during the second half of the year has led to the belief that an eruption is most likely in autumn, even though scientific research and historical documentation has shown that eruptions have occurred during different months of the year (Larsen 2000). Regardless of the resident's knowledge about Katla's activities in the past and the associated risk for the future, Johannesdottir and Gisladottir (2010) found that many residents were doubtful about an eruption in the looming future and they believed that the volcano is no longer active.

Cognitive dissonance as a coping strategy can thus even lead to the outright denial of risk. Beliefs as in the case of Iceland could lead to people being less attentive to hazard information and less likely to respond to warnings. This demonstrates the importance for emergency managers to take such beliefs into account to provide correct and up-to-date hazard information. Furthermore, as Gregg et al suggest, widespread direct exposure to non-damaging hazard events can foster the perception that future events will be similar and thus cause a normalization bias (Gregg et al. 2004). Indeed, as Johannesdottir and Gisladottir (2010) mention, after a long period of inactivity, people tend to forget the consequences of the hazard and consequently, and prevention and preparedness decrease.

In conclusion, the questions of why people continue to live in hazardous areas and how they cope with life in such settings can at least partly be answered by referring to culture.

3. Disaster Subcultures[5]

Communities living in hazard-ridden or disaster-prone areas develop an array of coping mechanisms as well as more deeply embedded practices to deal with threats and opportunities their environments encompass. The assemblage of cultural practices that over time emerges in response to recurring disasters has been identified as 'disaster subcultures' (Moore 1964; Wenger and Weller 1972, 1973; Anderson 1965, 1968). This concept was put forward in the 1960s and 1970s to shed light on the complex but intricate relationship between the human and natural world. Since then the notion has often been referred to (see for instance Gaillard et al. 2008 or Marín et al. 2010), but remains underemployed conceptually (Granot 1996; Bankoff 2003). Above in section 1.1 a definition of culture and subculture was already provided.

Experiencing recurrent disasters pushes communities to develop cultural strategies and practices to deal with these adverse events and ensure increasing levels of resilience. Since hazards vary per locality, different groups face different potential disasters. Subsequently, wider cultures that cover larger geographical areas, such as for instance a Dutch culture that should cover the complete Netherlands' territory, are generally unable to provide all its members with an exhaustive assortment of appropriate hazard-related solutions.

In addition, hazards generally do not strike on a daily basis. Therefore, readily available solutions and habitual modes of actions are often insufficient, and unique adaptations are required to deal with recurrent hazards. Over times this leads to a specific local subculture encompassing adaptive strategies that enable the community at hand to survive within hazardous environments. Moore (1964) first put forward the notion of 'disaster subcultures' to refer to these subcultures and shed light on 'those adjustments, actual and potential, social, psychological and physical, which are used by residents of [hazardous] areas in their efforts to cope with disasters which have struck or which tradition indicates may strike in the future' (Moore 1964: 195).

Even though disaster subcultures consist of coping mechanisms that communities have historically found adequate, it is important to note that they can become a debilitating factor when conditions change (Wenger and Weller 1972; Kuhlicke et al. 2011). For instance, in New Orleans during both Hurricane Betsy (1965) and Hurricane Katrina (2005), the community's response was ineffective because they were confronted with another disaster agent than the recurrent agent. Their disaster subculture was directed at hurricanes and was not suitable for large-scale flooding. Another concern can be the generation of a defiant attitude toward a disaster agent due to the perceived effective containment of this agent (Wenger and Weller 1972). Such an attitude can lead to what is known as the safe paradox (Burby 2006) or the

[5] This chapter is based on: Karen Engel, Georg Frerks, Lucia Velotti, Jeroen Warner and Bart Weijs (2014) Flood disaster subcultures in The Netherlands: the parishes of Borgharen and Itteren, *Natural Hazards*, Journal of the International Society for the Prevention and Mitigation of Natural Hazards, Natural Hazards, 73(2), 859-882.

levee effect (White 1945): a sceptical attitude toward warning signals or the underestimation of a threatening situation due to an increased feeling of safety.

The work of Wenger and Weller that is based on literature studies of disasters, mainly in relation to the United States, provides us a conceptual framework for disaster subcultures. That framework outlines firstly three *key conditions* that should be met for a community to start cultivating a disaster subculture, namely (1) a community should face and acknowledge the existence of a recurrent threat, (2) the focal agent should allow for a period of forewarning and (3) the impact of focal agents should be salient to different segments (various status levels) of the communities (Wenger and Weller 1972). The framework further includes *valuative elements* that define what is important and worthwhile when a hazard strikes and *normative elements* that outline desirable behavior in relation to the hazard at hand. For instance, how should one respond to the possibility of the hazard striking in a short period of time? How should such a threat be interpreted and what actions should it trigger? In addition, there are *beliefs* that encompass tenets concerning the hazard and its possible consequences. For instance, community members might believe that certain areas are safer than others or that they have the capability of controlling the hazard to such an extent that it is no longer a threat. Beliefs such as the latter can result in specific *attitudes*. For instance, a firm belief in a community's ability to control the hazard they face can lead to a 'defiance of nature' attitude. Communities furthermore develop *knowledge*. Knowledge is related to a community's awareness, levels of information and the active application of available information. For instance, previous hazard experiences can enable communities to know possible warning cues and subsequently initiate timely protective behavior. Aside from such ideational elements, the framework also recognizes the role of *technology* or complex technical artifacts. A community could for instance develop sophisticated methods of detection and warning. Lastly, the framework encompasses patterns for *intra- and inter-organizational response* and *socialization* mechanisms. The former encompasses for instance disaster plans and routine responses, while the latter allow for the preservation of the different themes that make up the disaster subculture. Formal and informal mechanisms of socialization serve to engage newcomers and equip them with requisite knowledge and other cultural elements. According to Wenger and Weller '[t]he true indication of the existence of a disaster subculture… is the perpetuation of successful patterns of adaptation to the disaster context through socialization' (1972: 1)

Finally, Wenger and Weller have distinguished several *dimensions* along which disaster subcultures can be analysed and compared: 1) the manifest/latent dimension; 2) the individual-organizational dimension; 3) the instrumental/expressive dimension; 4) the narrow/broad scope dimension.

For EDUCEN the different elements of the framework outlined above and the various dimensions of disaster subcultures can help to map the prevailing disaster subcultures among different cities or segments of the population.

4. Beliefs and religion

Religion, as part of our definition of culture, influences how we see disasters by providing meaning and sense of the world. It is thought to bind people together, gives comfort, and religious rituals are practiced as a way to cope with disasters. Vice versa, disasters influence religious beliefs by challenging existing interpretations of the world. Overall, religion can be used by people to understand, give meaning to (box 3) and adapt to natural hazards (Kemkens n.d.). Religious institutions are considered important in facilitating collective action within the religious communities, as well as play an active role in disaster response and recovery. Notions of religion and disaster are socially constructed. These notions – like the EDUCEN project stresses and as is stressed from an anthropological lens – are often challenged, not fixed, and are embedded in local cultural contexts (Oliver-Smith and Hoffman 2002, Schlehe 2010). Hence, they cannot be seen in isolation from identity, politics and power (Kemkens n.d.).

In this literature review, we have sought examples in European cities that shed light on how religion and disasters are connected, what the assets and obstacles of religion are, and what we may learn from them in practice for risk reduction and disaster response. Although it is not the place for an extensive discussion of the topic here, as will become clear in this section, there are many ways in which the subjects of religion and disaster interconnect. Yet, we have noticed that other than those on the Lisbon earthquake in 1755, studies related to the topic particularly in European cities are severely difficult to find. Perhaps, this is related to a surprising neglect of the role of religious institutions in disaster studies, as identified in a special issue of the journal *Religion* on the theme of religion, natural hazards, and disasters. According to the editors of this special issue, all major – both old and recent – treaties on hazards and disasters have overlooked or totally omitted the topic of religion (Gaillard and Texier 2010). Unfortunately for EDUCEN's focus, this issue focuses to a large extent on cases in Asian countries. Related to lack of attention to the topic, the role that local churches and mosques play in disaster response in particular has been undocumented, underestimated, and overshadowed (Cheema et al. 2014).

Yet, especially within the reconstruction phase following disasters, it is important not only to pay attention to physical reconstruction, but also to aspects of social, psychological, and spiritual wellbeing (Kemkens n.d.). First, the lack of attention paid to religion is even more surprising when considering that religious groups and organisations are usually the first responders. Second, religious institutions have been serving affected communities in the face of disasters, for example by providing food and shelter already long before the European tradition of humanitarian aid provided by (non)governmental organisations came into being. Third, disaster stories can be found in the Islam, Judaism, and Christianity (Dynes 2003, Kemkens n.d., Gaillard and Texier 2010).

For example, it has been argued that Noah and the flood story has provided a central cultural symbolism of disaster that to this day continues to influence emergency planning and how

disasters are imagined for those in the Western World (Dynes 2003). While some of the elements of the flood story have been modified over time, other dimensions have been generalized to include other disasters. The flood story, it is argued, typifies the destruction of social order due to disaster. Furthermore, like in the flood story, during a disaster there is often the assumption that people behave badly and need authority to behave appropriately. The destruction of resources and the incapacity of affected people necessitates external intervention. After the intervention that includes heroic behaviour, it is possible to re-establish order, marking the end of chaos, bad behaviour, and the beginning of renewal (ibid). Often disasters are being reported in such terms.

The notion that disasters were a direct consequence of God's punishment changed due to increased scientific understanding, secularization of political power, and the modern state (Kemkens). In the Age of Enlightenment the 1755 Lisbon Earthquake – that resulted in a dark cloud of dust, fires, and a tsunami – proved to be a turning point in disaster thinking (Poirier 2006, Dynes 2003, Kemkens n.d, Cartwright and Nakamura 2008). It can be seen as the first major disaster whereby scientists sought to explain disasters through geology and seismology for example, and organize disaster response through authorities and institutions supported by 'science' and 'reason' (Kemkens n.d.). Yet, it was not the case that perspectives changed abruptly. The general population of the time still thought of the earthquake as being a punishment from God for human sin. What did change was the basic assumption of the flood story that disasters represented chaos that needs to be responded to through command and control, from above, from God. This assumption could be easily transferred to political leaders, many of whom claimed lineage to ultimate authority anyway as they claimed kinship to God (Dynes 2003).

Before discussing the potential cultural assets and obstacles of religion for individuals in the context of disasters, a few things that are mentioned by Kemkens (n.d.) need to be taken into consideration. Firstly, these assets and obstacles do not suddenly arise in times of disaster, but they may become relevant and apparent related to resilience and vulnerability. Secondly, as mentioned above, it is important to keep in mind that the religious beliefs and practices of individuals are not static but dynamic. Thirdly, due to contextual dynamics, no generalized conclusion can be drawn on whether a particular person will actually benefit from, or be hindered by, his or her religion in times of disaster. Finally, a number of religious dimensions, such as beliefs, rituals, and social networks, mediate the potential assets or obstacles of religion, making it difficult to simply point at causal relations.

These warnings mentioned, based on the few examples in the literature, it is possible to provide an overview of the potential and complex assets and obstacles of religion for people in disaster contexts. Religious groups are usually well integrated within local communities and thus often able to respond to disaster in a very short time span. Moreover, these organizations often benefit from a high level of trust among local communities (Gaillard and Texier 2010). For example, in New Orleans**,** based on the role of the Catholic Church, the Village de L'Est – where a Vietnamese immigrant community lives and that was severely flooded during Hurricane Katrina – was able to return and rebuild more efficiently than less damaged and richer neighbourhoods. This neighbourhood rebuilt so fast due to a combination of the strong

social ties amongst the Vietnamese immigrants and the local church that had ties as well to the Vietnamese community. The church shared goods and played a central role in the coordination for recovery. Together with the community they organized political action to protect the area from outside redevelopment and zoning changes (Aldrich and Meyer 2015).

Another example comes from the contribution of mosques in cultural, economic, social and political aspects of the lives of earthquake-affected communities in Pakistan (Cheema et al. 2014). During response and relief, mosques – as they were located in the centre of communities and had loudspeakers – functioned as an initial contact point, as spaces for social coordination and integration, as spaces where vulnerable groups were looked after, as central points for providing information to the community, and as institutions that provided spiritual support. During recovery, reconstruction and rehabilitation, they continued to be spaces for both psychosocial and livelihood support (ibid). Importantly, there was diversity in how communities related to their mosques and consequently the roles that mosques – often in, yet not limited to, the person of the Imam – played in post-disaster settings. Imams operated in the role of, what the EDUCEN proposal has called, 'brokers', as they arranged, joined, and coordinated meetings between aid organisations and village communities. However, often, the community was uncomfortable with, or sceptical about, their Imam's involvement in the coordination of relief and rehabilitation. They felt that the role of the Imam should be limited to being a spiritual or personal guide, rather than expanded to include involvement with politicians and financial resources. Where this was the case it affected the role of Imams in relief and rehabilitation (ibid). This highlights again the importance of local context that needs to be taken into account when EDUCEN proposes tools for culture (or religion in this case) in disaster risk reduction.

In addition to the many potential functions religion may serve in contributing to recovery, there are also a number of potential obstacles related to religion that may be a challenge for religious communities or disaster responders. Most often mentioned here is that of fatalistic attitudes. Religious fatalism refers to the idea that the occurrence of events is predetermined and that people cannot or should not control the occurrence of these events nor its outcomes. To this light, religious communities may prefer to wait for evacuation orders of their spiritual leaders rather than directly follow government orders, as happened during the eruption of Merapi in Indonesia in year 2006 (Kulatunga 2010).

A few critical notes are necessary on the assumptions within the existing academic literature on religious fatalistic beliefs in the context of disaster. First, as mentioned before, these beliefs may actually form a coping mechanism as discussed by Gaillard and Texier (2010). Second, the before mentioned authors warn that this discourse "fails to consider the diversity of religious beliefs and their local cultural contexts" (ibid: 82). As may become clear from box three, interpretations of disasters are highly heterogeneous and religious beliefs and rational risk evaluation are not mutually exclusive.

In addition, (politicized) perspectives on 'religion and gender' or 'religion and conflict' may hamper collaboration between non-faith based disaster aid organisations and religious institutions (Cheema et al. 2014). In yet another way, next to playing an inclusionary role,

religion can play a negative role when people are marginalized on the basis of their religious identity. For example, people may be excluded from aid on the basis of their religion, making them potentially more vulnerable in the context of disasters.

Therefore, understandings of disasters within religious frameworks are not confined to pre-industrial societies and are more widespread than is commonly assumed (Chester, Duncan, and Dibben 2008). In fact, as discussed in box three, religious perspectives are still important for the ways in which people perceive natural disasters such as volcanic eruptions.

Box 3: Religion and disaster in Italy

Spirituality and religion in the aftermath of L'Aquilla's earthquake

The collective experience and understanding that religion brings may be an important asset in coping with disasters. In 2009 an earthquake struck EDUCEN case study city L'Aquila. The L'Aquila earthquake caused the death of 309 people, with more than 1000 individuals injured and 66000 displaced. Spiritual and religious dimensions likely helped the survivors to overcome the trauma as well as the psychosocial problems that arose following the earthquake. Spirituality is the personal quest for understanding answers to questions about life, meaning, and relationship with the sacred. Although there is little agreement on how to measure spirituality, individuals appear to have little trouble rating themselves on their own level of spirituality. Religiousness facilitates spirituality as an organized system of beliefs, practices, rituals and symbols. It has been argued that religious, more than spiritual factors, enabled adaptive features to be effective to enhance resilience in the aftermath of the earthquake (Stratta et al. 2013).

Religion and volcanic risk in Southern Italy (Etna and Vesuvius)

Religious terms of reference have been and remain vital elements in the perceptions held by a significant proportion of the population in Southern Italy when confronted by volcanic eruptions, particularly those that have occurred on Vesuvius and Etna. Many of Mount Etna's eruptions have been associated by Roman Catholic communities living in the vicinity with religious interpretations and rites. Among the general public living in the vicinity of Mount Etna, there is the belief that disasters may be averted through religious faith and practice through the role of saints. Some people believed the patron saint of the town could have stopped the lava, so some people decided to put the statue of the saint in front of the oncoming lava. They positioned it 50 metres away, hoping it would perform a miracle but it was no good. Yet, in Southern Italy there is neither negative evidence of fatalism, nor that action by the government has been resisted on purely religious grounds. For example the evacuations carried out during the 1906 and 1944 eruptions of Vesuvius had the general support of the populations affected, while on Etna no central or local government initiatives have been resisted because of religious considerations (for more information see Chester, Duncan, and Dibben 2008).

Box 4: Community level religious disaster response to floods in rural England

Somerset is a rural county in South West England. From mid December 2013 towards March 2014 the area experienced severe flooding. Although affected areas varied throughout the months, the area flooded went up to 12,200 hectares. About 200 homes were directly affected. Daily changes in water height as a result of tidal impacts added to the uncertainty. After a visit to the area Peter Maurice, Bishop of Taunton (Somerset's county town) called for a briefing on the floods. Subsequently he started correspondence in the form of open letters and a number of bishops started to co-ordinate together.

As a result of the correspondence good like bedding and clothes were brought to the church and there were donations like eggs from a local farmer, and free fruits and vegetables. Further practical and financial generosity was shown by many other churches and faith groups nationally including Jews and Muslims. The latter visited to express solidarity and donated £16000 to the Somerset Community Foundation.

The Bishop commissioned a report entitled *Fact, Feeling, Future* (Gurner 2014) that includes both prayers and recommendations to help inform the diocesan response in the mid to long term. The report quotes local parishioners and clergy who feel they were attended to too late and inappropriately by the government and the Environmental Agency. In addition it provides some recommendations of what could be done by the diocese, such as the forming of coordinating commissions and voluntary contact persons in case of future disasters.

It can be concluded from the current literature review on the topic of religion and disasters that religion plays an important role in the aftermath of disasters. For individuals affected by disaster, religion can serve a variety of functions. Also, it can be concluded that there is consensus for considering religion as a resource rather than a hindrance in the planning of disaster risk-reduction policies (Gaillard and Texier 2010). It is possible for disaster management and planning to integrate the leadership roles of clergy and the historical experience of the church in charitable work into effective programmes of disaster relief. Yet again, due to the importance of the local context for religion (Oliver-Smith and Hoffman 2002) and the multifaceted and distinct roles of religious institutions (Cheema et al. 2014), a thorough understanding of the local context is crucial.

5. Gender and disaster

The last two decades, gender issues have become increasingly an explicit part of disaster analysis and management and there is a growing body of knowledge and literature dealing with the nexus between gender and disaster. This literature is often policy-driven and motivated by the question of how to intervene in disaster situations without losing track of their gender dimensions, not rarely with the explicit aim to prevent that women are overlooked or marginalised in disaster aid. Much emergency aid in disasters is not tuned to the gender-specific needs and problems that women face.

For our purpose gender is defined as "the socially defined or constructed sex roles, attitudes and values which communities and societies ascribe as appropriate for one sex or the other. Gender does not describe the biological sexual charateristics by which females and males are identified" (The Sphere Project 2000). Bouta, Frerks and Bannon say that: "Gender roles vary according to socio-economic, political and cultural contexts, and are affected by other factors, including age, class and ethnicity. Gender roles are learned and negotiated, or contested. They are therefore changeable. Besides differences in roles *between* women and men, roles *among* women and men differ as well, while both women and men may also combine different roles individually over time or even simultaneously" (2005: 3). Disasters or conflict often serve as moments of change and levellers of gender roles.

It should, however, be underlined that making gender synonymous with the positions and roles of women and men constitutes an extremely limiting and reductionist gender view. According to Dubravka Zarkov gender is better seen as an organizing principle of social life that affects different levels of social reality, not only individual people. She mentions among others the level of institutions and organizations producing specific masculinities and femininities; the level of ideology and doctrine with their gendered values and norms; the symbolic level that attaches male or female bodies as symbols of nations and states, or gendered meanings of notions such as war or sovereignty. Finally, processes are gendered (based on gendered assumptions). Gender is part of everyday social relations of power that reproduce or challenge gender and gendered relations (Zarkov in Bouta et al 2005).

Gender is of utmost relevance to disasters and disaster management. First of all, the effects and impacts of disasters differ for men and women. This is due to biological, sexual and socio-cultural factors including gender relations in a community. Different reproductive functions, menstruation, pregnancy, child bearing and lactating require culturally adapted support and protection for women and girls.

The above mentioned biological and gender dynamics often translate in particular gender-specific patterns of vulnerability as well as resilience. They also affect patterns of coping, how disaster experiences are built up, and risks perceived, how risk awareness is distributed and attitudes forged. In many instances the distribution of knowledge, assets, income, livelihood possibilities, decision-making power, and access to services is also highly gendered. Reviewing

those patterns, Ariyabandu speaks of women as 'the vulnerable among the vulnerable' (Ariyabandu 2009).

In addition, women and girls are often seen as physically and emotionally weak, inferior to men and boys, dependent, subordinate and generally as a burden. In disaster these perceptions are extended to identify them as passive and incapacitated victims (Ariyabandu 2009). In reality, women appear to have valuable knowledge, skills and experiences, but this goes unnoticed in disaster policies and formal disaster mitigation and recovery arrangements (ibid).

There is evidence that the mortality rates in recent disasters (esp. the Indian Ocean tsunami) have been higher for women than for men, due to a combination of cultural aspects and gendered patterns of vulnerability. But also the disaster recovery is biased with less participation, access and rights for women (ibid). On the other hand, a gender focus should not exclude men. Gender is always a relational topic, and also men and boys have specific needs, capabilities and vulnerabilities. It is also of the essence to deal with masculinities and the way they inform male behaviour and attitudes. Several programmes did focus on women only, sidelining men who also had lost nearly all they had in the disaster and also had their share of grief and sorrow. But apart from that, successful interventions simply will have to include men, in an effort of 'men-streaming', as it was dubbed by Bannon and Correia (2006) as meaningful changes cannot happen without the 'other half of gender', as Bannon and Correia have titled their book on men's issues in development.

It now has been recognized that gender inclusiveness is vital for policies to become effective. The General Assembly and the Hyogo Framework for Action state that: "A gender perspective should be integrated into all disaster risk management policies, plans and decision-making processes, including those related to risk assessment, early warning, information management, and education and training" (quoted in Valdés 2009: 19).

There is a burgeoning literature on how to make disaster management gender-aware, gender-inclusive, gender-specific, gender-fair or simply 'gendered'. It is not possible in this short chapter to do justice to all what has been written. We shall mention a few references that can further guide researchers and practitioners in the EDUCEN project.

Elaine Enarson is the founder of the Gender and Disaster Network (GDN) and she is one of the most influential scholarly writers on the subject. Her several publications are a rich source to review the debate. The chapters 'Representation of Women in Disasters'' and 'How Gender Changes Disaster Studies' in her book are very informative and insightful (Enarson 2011). Enarson designed for the GDN "Six principles for engendered relief and reconstruction'' comprising again over fifty issues warranting attention in disaster planning, analysis and implementation (reproduced in Valdés 2009).

The website of GDN (www.gdnonline.org/sourcebook/index.htm) provides acces to the Gender and Disaster Sourcebook. In addition, Chakrabarti and Walia offer a comprehensive toolkit for mainstreaming gender in emergency response, comprising again sixteen partial

toolkits for the issues covered varying from preparedeness and early warning, search and rescue, health, livelihood and watsan (2009).

Based on its experiences with the tsunami relief aid in Sri Lanka, UNIFEM has gendered the five priority areas of the Hyogo Platform for Action (reproduced in Joshi and Bhatt 2009). In addition Joshi and Bhatt offer six specific recommentations to better engender future disaster recovery (see 2009: 318).

This is only a first selection of relevant materials available. Based on the experiences in the EDUCEN project and the prospective case studies a more specific search can be done to further guide the ongoing work from a gender perspective.

6. Disasters in urban settings

Most knowledge on 'culture and disasters' relates to rural livelihoods and settings (Pelling 2012). The lack of a critical assessment on 'culture' in 'urban disasters' may be explained by the historical development of disaster studies. This area of research has to a large extent examined rural events, particularly floods and famines. In contrast with rural areas, cities have often been seen as offering some security as they could provide access to food and other resources (e.g. financial or know-how) to survive disasters. It is common for people to see the city as being in control of nature, since (indoor) temperature can be moderated, diseases controlled with vaccines, and floodwaters channelled away through smart engineering and urban planning. Yet, due to increased urbanization, cities – if they have not always needed to do so – have to deal with an increasing variety of risks.

Urban areas are not immune to the forces of nature. Flooding, once a classic hazard of rural areas, has become a predominantly urban event (Green in Blaikie et al. 1994). However, when compared to rural areas, cities have more complex infrastructures, and may be culturally less homogeneous. In this light, (mega)cities are receiving the attention they merit from scholars and practitioners interested in DRR. Yet, these studies have often focussed on countries in the so called developing world, where landslides of waste and precarious housing of people living in slums are extreme examples of risks and disasters in the urban setting.

Cities are of crucial economic importance to their countries, and often even for multiple countries. They influence political activities as well, since the intellectual, corporate, and political leaders are often located there. In cities, people have become dependent on the proper functioning of transportation-, power-, water-, and communication systems amongst others. If there is a major disaster, flows of people, money, information, and products, get disrupted, hence upsetting the social, economic, and political fabric of the country or surrounding region (Wenzel, Bendimerad, and Sinha 2007). They are a priority in the EDUCEN project for a number of other reasons.

First, cities are densely populated and complex in terms of administration. The large number of people heightens the impact of a disaster. Another potential risk that population growth brings is urban drought, since it puts pressure on the provision of water for all citizens even in the state of normal activities. In addition, rapid city- and population growth renders existing figures and inventory of buildings quickly out-dated, complicating disaster risk reduction and management even more. Cities change at a fast rate, making the need for dynamic planning urgent.

Second, cities are congested places. The high rate of urban development has affected land use, urban drainage capacity, industry, and architectural forms (Chou and Wu 2014), in such a way that it can hinder the adequate functioning of services that require space (water, drainage, sanitation). In addition, this can reduce access for disaster responders due to a lack of proper road cover.

Third, cities are characterized by a complex (and often ageing) infrastructure, with limited recreational (green) areas. With regard to culture in infrastructure, EDUCEN studies 'hard (grey/green) infrastructure' and supply chains, that move across (urban and national) borders. Although a working infrastructure contributes to a city's attractiveness, as mentioned, this infrastructure constitutes a major component of the vulnerability of a city if disasters strike. Infrastructure itself can contribute to the intensification of existing hazards by influencing the urban climate, and resulting for instance in increased rainfall, temperature, local wind circulation, turbulence and gusts (Wamsler 2014). Urbanization affects disasters just as profoundly as disasters can affect urbanization (Pelling 2012).

Fourth, many cities are old, particularly in Europe, and built before disaster-proof building and design was practiced. Old city centres play key infrastructural, social, identity, and economic functions. For example, a Mediterranean town tends to be small and compact, which helps in adaptation to heat and for communal behaviour as well. Urban planners and disaster risk reduction experts could benefit from understanding such city characteristics, and as will be discussed in chapter eight, also from traditional building techniques. It may well be that these techniques were themselves part of an adaptation to disaster risks.

Fifth, the vulnerability of cities is enhanced by the fact that they are often located at naturally dangerous places (in valleys, deltas, rivers, downstream location). Next to risks from forces of nature, cities also face risk from technological hazards. Yet the latter is related to the development stage and size of the city. Larger and more industrially developed cities will face more sources of technological risk.

Identifying urban disasters

Now that the distinct relation between cities and disasters has been discussed in comparison with rural areas, it is possible to ask 'how to identify urban disasters?' (Pelling 2012). To answer this question it is necessary to define 'the urban' first. Defining or delimitating urban areas, is a difficult task. Urban areas can be defined by population density or size, by administrative region, or by their economic functions (i.e. industry and service sectors dominate over agriculture, forestry and mining). Defining 'urban disasters' is even more difficult, with each used approach having its limitations.

A common indicator of urban disaster is for the number of victims in proportion to the total population to be high. This approach, however, is limited by problems of data accuracy. The problem particularly comes visible when studying historical events. In addition, this proportional measure will cause many small events in large populations to be hidden.

Alternatively, urban disasters may be defined as only those events that have been felt to impact upon and cause dislocations within the 'urban system'. Under urban system would fall the economic functions of the city, urban political regime, and infrastructural integrity. An indicator of economic impact could be the contribution of urban activities to national gross domestic product (GDP). Changes in political and social organization could be indicated by changing crime rates or periods of military control. Impact on infrastructural integrity might be

indicated by the total number (or proportions of) destroyed or damaged hospitals, schools, sewers, roads, or electricity cables. However, this approach is also of limited use, since for the majority of cases such kind of figures are not available.

A third source of definition might be to include only those events that have been recognized as disasters by a third party, such as the national government, municipality, or international organization. Although this approach avoids the need for quantitative data, it is open for political distortions. Often agencies might want to suppress or exaggerate the importance of an event.

However, difficulty in defining urban disasters may be less of a weakness or problem than it may at first appear (Pelling 2012). Everyday hazards, from for example poor sanitation, unfit housing, (air and water) pollution, or errors in industries (ports, transportation, refineries etc.), are linked in complex ways to catastrophic disasters. Still, all of the above definitions of disaster fail to recognize the cumulative impact of these relatively small events.

Possibly less visible, inhabitants of the city deal with such events and their consequences on a daily basis. Within the city, communities of the poor and marginalized live, and have to cope with, the greatest threats to health and livelihood from disaster. As will be discussed in chapter nine, urban sub-communities such as illegal migrants, refugees, the homeless, travellers [gypsies], the handicapped, addicts, orthodox religious minorities, and criminal networks, may be treated as social outcasts and hard to reach for planners, managers and responders (Warner and Engel 2014). At the same time, they may well have strong survival networks among themselves that are likely to be highly diverse.

Summary Part I

The conceptual part of the report starts off with understandings of culture and disaster and working definitions. It is acknowleded that offering a single definition for culture is difficult and that culture is used to represent many different aspects of society, its creations and its interactions. Chapter one continues with understandings of disaster, stipulating the difference between hazard and disaster; whereas the term hazard is used to describe an extreme event unrelated to human activity, disaster refers to the societal processes that lead to human suffering. It is concluded that it is widely recognized that disasters are the result of the complex interaction between hazards and the human communities affected by them.

The second chapter attempts to capture the key discussions in the literature: vulnerability, resilience, risk perception, and coping strategies to risk have been identified as the topics most relevant to the EDUCEN project. First, vulnerability and resilience are discussed. While both concepts can be helpful in identifying culture, they are also criticized for respectively the focus on people as passive victims, and for being too broad of a concept. Strikingly, both concepts largely neglect the role of culture in either constructing vulnerability or resilience. The next concept discussed extensively in the literature and in many social and scientific contexts is risk perception. It is explained that risk perception is a sociocultural phenomenon, often relying on intuitive risk judgment or beliefs rather than on rational deliberation. Previous hazard experience, personal characteristics, and trust in scientific experts and authorities have been mentioned as determinants of risk perception. The chapter continues with a section on people's reasons for continuing to live in hazardous places and the coping mechanisms they use to reduce emotional stress. The chapter concludes that an understanding of differing risk perceptions and the reasons behind peoples reluctance to prepare and act upon risk is crucial for effective disaster management.

Chapter three deals specifically with disaster subculture. The chapter explains that wider cultures that cover larger geographical areas are generally unable to provide all its members with a complete variety of situation specific hazard-related solutions. Readily available solutions and habitual modes of actions are often insufficient, and unique adaptations are required to deal with recurrent hazards. Over times this leads to a specific local subculture encompassing adaptive strategies that enable the community at hand to survive within hazardous environments. The chapter furthermore elaborates on the work of Wenger and Weller which provides a useful conceptual framework for disaster subcultures. For EDUCEN the different elements of this framework and the various dimensions of disaster subcultures can help to map the prevailing disaster subcultures among different cities or segments of the population.

In chapter four, beliefs and religion are discussed. The literature review revealed that although there are many ways in which disaster and religion interconnect, studies on European cities are difficult to find. The chapter explains how religion can function both as an asset, -being well integrated within local communities, able to quickly respond and having a high level of trust from communities- and as an obstacle –due to fatalistic beliefs and exclusion from aid on the basis of religion- to disaster management

Chapter five deals with gender and clarifies that gender does not describe the biological sexual characteristics by which females and males are identified. Rather, gender roles vary according to contexts and are affected by factors such as age, class and ethnicity. Gender roles are learned and negotiated and therefore changeable. The chapter highlights that gender is of crucial importance to disasters and disaster management. Due to biological, sexual and socio-cultural factors including gender relations in a community, the effects and impacts of disasters differ for men and women. These dynamics often translate in particular gender specific patterns of vulnerability as well as resilience and affect patterns of coping, risk perception, and attitudes. In many instances the distribution of knowledge, assets, income, livelihood possibilities, decision making power, and access to services is also highly gendered. The chapter ends with providing several suggestions for relevant material to guide the EDUCEN work from a gender perspective.

Part 1 concludes with a conceptual introduction to disasters in urban settings. Research for this literature review confirmed that there is a lack of critical assessments on culture in urban settings. Nevertheless, urban areas are not immune for disaster and impact of hazard might be devastating. Cities are crucial for economic purposes, densely populated, often old, and characterized by a complex physical and social infrastructure, making them extremely vulnerable. It is therefore of utmost importance to improve the knowledge in this field.

Part I emphasizes that culture is a critical driver of risk, vulnerability, and resilience. Understanding how people, their actions and their position in society, are influenced by these cultural aspects is of crucial importance to effective disaster management.

Part II: Key topics

7. Cultural memory

The first topic identified as key for the EDUCEN project is cultural memory. Disasters deeply shape people's sense of history and in doing so shape culture. Moreover, historical choices tend to have a path dependency impinging on future developments.

Cultural memory reveals how communities adapt their cultural reservoirs over time in light of disastrous events based on shared experience and local knowledge of a group of people. Cultural memory also includes understanding how "catastrophic events" are absorbed into history and exert an indirect influence on culture by contributing to its historical context, often in subtle ways (Alexander 2000). In short, the concept of cultural memory refers to the recording and handing down of meanings and interpretation from generation to generation (Kempe 2007).

The issue of cultural memory as an interdisciplinary approach for the study of cultural commemoration was framed by Jan Asseman (1992). Other works dealing with the issue are Pierre Nova (1997) who focused on the ''sites of memory'' and Halbwach's (1950) works on collective memory. A distinction should be made between collective memory, or social short term memory, and cultural memory, or social long term memory. Collective memory is based on oral tradition, shared by the group, often the family, and tends to disappear with the death of the last eyewitness of the event. Cultural memory goes further back and is understood as a social long-term memory based on written and material sources. This form of memory needs to be underpinned with documents such as newspapers, archives, pictures, monuments, and photo albums (Pfister 2010). These kinds of memories are central to the constitution of culture.

Hazards are retained in memory if they occur frequently, and the more frequently they occur, the more people are likely to foresee them and to try to develop adequate adaptive strategies. As stated by Mauelshagen ''all preventive strategies are based on the expectations generated by repeated experiences. Repetition therefore becomes a key concept in historical research on learning from disasters'' (Mauelshagen in Pfister 2010). Severe disasters need to be permanently remembered in order to safeguard against the same devastating impact if they recur. The documentation of disasters and extreme events is therefore a crucial element in cultural memory. Memorials in the public sphere are particularly well suited to recall the memory of historical events. High water marks carved on the walls of public or private buildings for example are a way to compare the frequency and severity of floods over time. They are also used as points of comparison for each subsequent flood.

Figure 2 A storm-tide commemorative tablet in Tonning, Germany, with the inscription ''mind the next flood!'' (from Kempe 2015)

When remembered, memorialised and compared, experiences of disasters may inspire the invention of social practices and techniques in dealing with catastrophes. Thus, memory is crucial for the development of coping strategies. The memory of natural disaster, in contrast to the memory of war, is however strikingly short-lived. As demonstrated by the work of Pfister et al (2010) on the cultural memory of three severe storms in the first half of the eighteenth century, there are significant gaps in our knowledge of European storms. Such shortcomings in cultural memory might prevent the anticipation of future storms. It furthermore prevents an appropriate assessment of present and future risks that to some extent hinges on the knowledge of past events. Indeed, as stated by Kempe, ''History should not be understood as a mere representation of a past time but as a connective structure between the present time and the past constituted by the present'' (2007: 330).

Importantly, cultural memory does not always need to be a positive force. Sometimes memories can be important barriers to change and misinform adaptation strategies.

8. Physical city infrastructure

The second topic identified as key for EDUCEN is physical city infrastructure, involving amendments to the physical surroundings and landschape to serve a given purpose (e.g. transportation, supply of electricity, water supply, management). The chapter first looks the influence of structural patterns of cities and land-use on the effects of a crisis situation. Second, the influence of culture on structural patterns of cities is discussed. Last, cultural heritage is discussed.

8.1 The structural pattern of cities

We understand a city as a constructed space in which human actions take place. Hillier and Vaughan (2007) state that the city is composed of two things: a large collection of buildings linked by space, “the physical city”, and a complex system of human activity linked by interaction, “the social city”. The interrelationship between social and structural patterns of cities has been a long discussed topic since Sir Patrick Geddes (1885, 1997). Moreover, architect Jan Gehl (2010, 2011) stresses the interaction between physical and social space. He states that human behaviour can be influenced by urban structures and planning. We would like to add a third element: nature.
There are three elements which form the shape of a city;

1. The man-made structure (including street network and placement of buildings on it)
2. The nature
3. Activities (economic, social and organizational (Figure 3).

Figure 3: The city pattern (source: POLIMI)

The formation of urban space

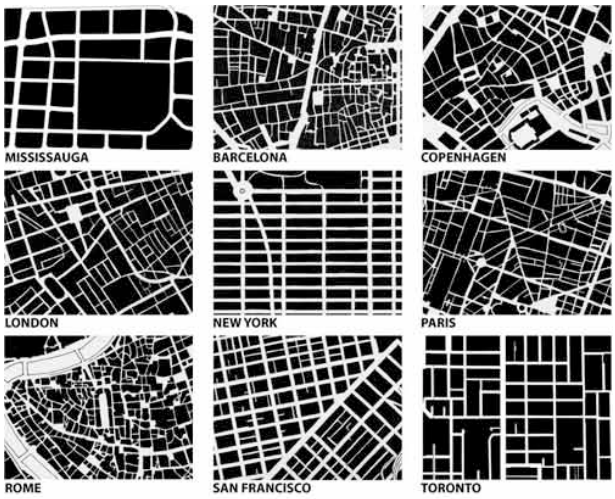

Figure 4 Examples of city patterns (Biennale Vienezia 2006)

Although all cities include infrastructure, buildings and activities, the shape, distribution and density of those elements provide the city with its general structure. The pattern of a street network, the building blocks on it and the buildings give shape to a city. Several examples of street patterns can be found in figure 4. San Francisco, Toronto and New York all have the grid shape street pattern, but the orientation of streets, and the size of the building blocks and buildings are different, therefore the structural characteristics of those cities are different from each other.

The structural pattern of Barcelona includes both organic and grid street pattern. The city centre has the traditional pattern and the grid pattern was chosen to extend the urban structure. The buildings are attached to open spaces in the middle of the Building blocks. Figure 6 is an example of the building blocks in Barcelona.

Figure 5: Example of building blocks in Barcelona

In the example of Barcelona, the different construction phases of the city are also visible due to changing construction techniques.

Nature and the city

As mentioned at the beginning, nature is the second main element that affects the structure of a city pattern. In some cities, such as Dordrecht, the nature is very much integrated into the city pattern and the structure and activities of the city are shaped according to nature (Figure 6 and Figure 7).

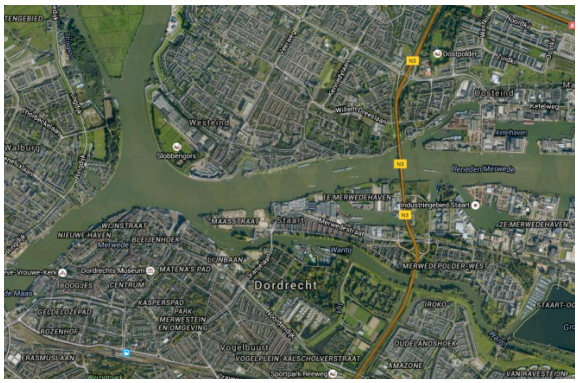

Figure 6: Air view of Dordrecht (google maps)

Figure 7: Strong relation with water in Dordrecht, nature shapes the city pattern

There are also cities that are constructed without considering the natural pattern of the city, such as San Francisco. The grid pattern shapes the city even though it is located on the hills and the grid pattern is generally chosen for flat landscapes.

Activities: Land-use

The location of urban centres has a profound impact on the vulnerability of those urban centres. Construction on land that is vulnerable to disasters like flooding and earthquakes, increases the potential impact of a disaster. The flood protection systems in the Netherlands for example have allowed the country to develop itself economically and socially, but have at the same time increased the potential impact of a disaster (Kolen, Hommes, & Huijskes 2013). Which and how land is used has an impact on disaster risk and vulnerabilities. One of the most famous examples of land use planning in a urban setting is the city of New Orleans in Louisiana, USA.

New Orleans was founded to exploit the possible benefits of the Mississippi river. This clarifies why the city was constructed in swamps below sea level, and in a location vulnerable to hurricanes and floods (Campanella, Etheridge, & Meffert 2004). Throughout the years the wetlands surrounding and protecting the city of New Orleans disappeared by natural causes and the exploitation of the wetlands for infrastructure. This process increased when oil and gas industry expanded into the wetlands surrounding New Orleans. This land use practise close to the urban area, resulted in the loss of 25 square miles per year, in the 50 years before 2006 (Laska & Morrow 2006). Furthermore the land use of the city of New Orleans itself increased its vulnerability to floods. The US government approved plans after Hurricane Betsy that encompassed the improvement of existing levees and the construction of new levees with the intention to use the extra space that would be created for new development projects. At the same time a governmental flood insurance plan was created that would insure the new construction in the recently developed marshy lands. New Orleans constructed 29 000 new housing units and in neighbouring Jefferson parish forty-seven thousand units were constructed (Burby 2006). The land use policy created by the government and the city had the intention of increasing resilience of the city. Ultimately the result came out the opposite, increasing risk and vulnerability: the safety provided by the levees proved to be a false and 183

000 housing units were either destroyed or badly damaged (Laska & Morrow 2006). It can be concluded that the land use of the city of New Orleans increased the potential and actual damage of Huricane Katrina.

Density and accessibility

Here we would like to explain the effects of the structural pattern of a city on a crisis situation by using two key words: accessibility and density. The first aspect of accessibility is perceived as the possible routes from which help can be sent to the city in case of disaster. Urban areas on low lying land are generally easier to reach compared to cities in mountainous regions or on islands. The second aspect of accessibility is related to the access that people have to escape within the city and the availability of routes leading from the urban area. This aspect of accessibility is closely related with density, as density of buildings and the number of people within a city strongly impacts the accessibility to routes going in and out the urban area.

A city is not constructed by solid elements only, open areas are also a part of it. During a crisis open areas are important, as they can substitute the functions of the buildings or fill a role within the evacuation of people. In case of an earthquake most of the buildings are not suitable or safe for habitation. Furthermore in the case of further seismic shocks, people are not allowed to live inside unsafe buildings. Therefore, people start constructing temporary shelters, hospitals; even administration activities are carried in the parks, squares, gardens in between buildings. Cities with a low density and access to open areas are more suitable during a disaster as people are more able to evacuate themselves towards open areas, either outside the city or to open areas within the city. Although this is mostly relevant to seismic disasters, quick access to escape routes is also vital during extreme weather events and/or flooding.

Density and accessibility in urban areas are partly driven by cultural aspect. An example of this is the Portuguese city of Lisbon. Lisbon already had a history in public works and standards in building codes, when in 1775 a catastrophic earthquake destroyed large parts of the city (Barreiros 2008). In order to prevent a reconstruction process that would make the city of Lisbon as dense and dangerous as it was before the earthquake, officials created strict requirements and regulations for the reconstruction effort (Mullin, 1992). The plans on which the reconstruction effort would be based called for broader streets and lower buildings. This was not only for practical and health reasons, but also to decrease the density so that spaces would remain save within the city even in the case of another earthquake where buildings would be destroyed (Mullin 1992).

Influence of culture on structural pattern of cities

In his book Geographical Imaginations, Derek Gregory (1994) writes that the city resembles a part of a discourse. Cities are full of signs, symbols and practices within a physical and social network. Indeed, a city is a network of signs and actions through which we understand each other and make ourselves understandable to others. All those symbols, signs and practices literally construct the culture of cities. It is embedded into its structure and its way to organize and govern activities.

Centrality of cities is another issue that is strongly connected to the political and economic culture of a city.

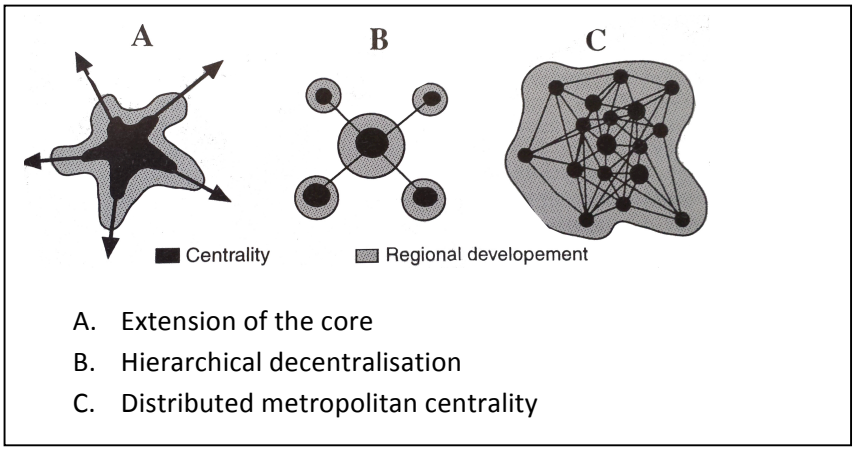

Figure 8: Centrality of cities (Dematteis, 1996, p.25)

Decisions taken during the development of an urban area, have a significant impact on the political and economic culture of a city. In case of a disaster, if a city has multiple centres, centres that are not or less severely affected can take over the activities of centres that were affected. Figure 8 presents different visualizations of urban areas with single or multiple centres. Mono-centric cities can be paralyzed during a crisis situation. Centres in this case does not only refer to physical city centres but also organizational centres from where decisions can be made, in normal situations and disaster situations. Kobe city is a good example of such a situation where there is a limit in centres, as the city is structurally linear and administratively mono-centric. That situation contributed to the high casualty rate of the 1995 Kobe Earthquake.

8.2 Cultural heritage and disaster risk reduction

Cultural heritage is commonly defined along the lines of 'the archeological and historical built environment and moveable heritage' (Taboroff 2003). This heritage serves a role in preserving local identity and personality, but also local knowledge; preserving heritage has educational purposes in awareness raising, as the layout of a city (plazas, avenues), the construction of buildings (Dordrecht's 'floating cellars') and infrastructure (multiple escape routes) may reveal a logic that is often more in tune with urban exposure to natural hazards than today's urban development. This is even more the case for ancient civilisations. While modern urban citizens are unlikely to be persuaded to live in round Mayan houses for reasons of disaster proofing, preserving this knowledge and its context reminds us of tested design principles that are easily forgotten. Material culture is composed of the tangible objects, movable or immovable, that people create or share, from storm-surge barriers and dikes, to disaster-proof houses that protect people from environmental hazards. Preserving and restoring ancient homes, roads

and infrastructure can also have a very concrete use in Disaster Risk Reduction, preventing expensive unreflective planning for the future 'from scratch'.

However, culture is not only material, it also has a nonmaterial component, and so can its heritage. Nonmaterial culture, as elaborated in Chapter Two, comprises beliefs, values, language, rules of behaviour, family patterns, political systems and networks. It makes good sense to include the time-honed cultural practices in this definition, and arrive at cultural heritage as the 'products and processes of a culture that are preserved and passed on through the generations'.

Managing and protecting the physical city inevitably involves dealing with cultural heritage in both understandings. Below we highlight the historical role that the fire department and the building of dikes play in European disaster risk reduction, planning and governance. But we should realise material cultural heritage cannot really be dissocated from cultural practices that are often transmitted from one generation to another (nonmaterial culture). 'Building cultures are permeated by an evolved intelligence', responding to specific local challenges and using locally available materials (Garnier et al 2013).

Box 5: Cultural heritage of the fire department for disaster management in Europe

Fires, that are often fuelled by meteorological conditions such as droughts or strong winds, were the first type of disaster to be considered avoidable. Fire-prevention regulations and measures existed in parts of the Roman Empire, and many medieval towns had night watchmen whose chief responsibility was to alert the community in case of fire. Cultural (nonmaterial) learning processes that can be found in many (European) countries, and that originated from the medieval era, included the regulation of domestic and industrial fireplaces, the appointment of neighbourhood fire patrols, and the obligation of every household to possess a water bucket. In the early modem period city councils subsidized the maintenance of fire engines and improved public access to water for extinguishing accidental fires. Professional urban fire brigades were set up in the late nineteenth century. Methods used to cope with fire hazards paved the way for management of floods and other hazards. The fact that fire departments are still trained in many countries to handle all types of emergencies reflects this historical evolution (Pfister 2009).

Box 6: Dikes as cultural objects in the North Sea Coast's 'culture of disaster'

'*De nich will dieken, mutt wieken*'
(translated: He who does not want to build dikes, must go)
__German proverb

Water is the decisive key to understanding the social life of the communities on the North Sea coasts. A dominant role is played by the dikes. Since the twelfth century, they mark the boundary between the sea and the land, they protect the inhabitants, give them the opportunity to settle, to cultivate the country and to acquire new land. The history of dikes reflects not only the history of technology, but also legal history.

Every owner of the land was obliged to take care of the dike. This could be individually, for a certain section of the dike, or collectively with other members of the community. Anyone who violated this obligation could be forced to leave his land. Moreover, the dikes are important in the political history of the region, especially seen in the power struggles between (peasant) communities, local authorities, and the state. For instance, after the Christmas storm surge of 1717, the financial disaster of peasants could be used by the state government to acquire land. By diking the new land and by leasing it, the state government strengthened its power. Despite these efforts on the part of the state (of Denmark, Holland, Northern Germany or Lower Saxony), the people in Eastern and Northern Friesland tried to retain their independence and their cultural identity (for an elaborate description see Kempe 2007).

One of the cities with a particular focus on buildings and building practices is Istanbul, a city that works within the 'Earthquake and Megacities Initiative' (EMI), under the umbrella of UNESCO.[6]

Following the 1999 Marmara earthquake, EMI lent its support to the Istanbul Metropolitan Municipality (IMM) in the development of a comprehensive strategy for earthquake risk management and reduction. In Istanbul four Turkish universities, upon request of the IMM, developed the Istanbul Earthquake Master Plan (IEMP). One of the components of the IEMP is 'seismic assessment, evaluation, and strengthening of existing inventory of buildings with suggestions for several methods for the evaluation of the buildings'. At the same time the World Bank has launched a 1 billion dollar program for Istanbul, mostly devoted to retrofitting vulnerable building stock (Wenzel, Bendimerad, and Sinha 2007).

Next to such top down urban development Master Plans, attempting to prepare the city for future hazards, research at the European Centre for Cultural Heritage suggests a possible correlation between earthquake frequency and building practices (Karababa and Guthrie 2006). Prior to the global domination of the concrete industry, local building techniques developed through trial-and-error were used that took into account expected seismic activity. In other words, in places where earthquakes are frequent, seismic protection might have

[6] for a further elaboration on the disaster reduction strategy of the EMI see Wenzel, Bendimerad, and Sinha 2007)

become part of the (material) culture, as manifested through local building practices and perceptions. This, what could be called a seismic construction sub-culture, is a material expression of cultures of disaster from that time. Seismic construction sub-cultures are present in several areas in the world, as illustrated in box 7 below.

Box 7: Seismic construction sub-cultures

In areas of the world where earthquakes present a frequent threat to people's lives and assets, similar anti-seismic construction methods have evolved. Such seismic construction subcultures often use local materials, skills and resources. Traditional buildings are usually of configurations and have a small number of stories. A look at such cultures may help in vulnerability reduction and disaster mitigation. Examples that may be relevant for the EDUCEN project include, the *göz dolmas* and *muskali dolmas* technique in Turkey, the *casa baraccata* technique in Italy, the *pontelarisma* technique in Greece and the *Pombalina* structures in Portugal. The latter, *Pombalina* structures, originate from after the Lisbon Earthquake in 1755. Notable features of such structures include reinforcement by the *gaiola,* an internal wooden cage. These will be discussed in the following section.

From left to right: The *göz dolmas* and *muskali dolmas* technique in Turkey, the *gaiola* in Lisbon, and the *pontelarisma* technique in Lefkada (Greece).

8.3 Linking the physical with the social

As explained by Mc Daniels et al. (2008), the city infrastructural system has to be conceived as linked with social and institutional systems, but also with the economic and environmental ones that are all embedded within the urban context and dynamically interact (see also Bettencourt et al. 2010, Bozza et al. 2015). As discussed by Gasteyer (2004), physical infrastructures involve amendments to the physical surroundings and landscape to serve a given purpose (e.g. transportation; supply of electricity; or water supply, management, and treatment). Social infrastructure refers to the networks and interactions among individuals, groups, and institutions within and outside the community. Particularly, the link between infrastructural networks and social networks is crucial, since the resilience of a system is described by its level of functionality and assuming that it directly represents the level of satisfaction of citizens (Bozza et al. 2015). Such link is particularly strong in the HEO phase (Hazardous Event Occurrence). A urban system can be considered resilient if it is sustainable during the HEO phase, the period in which the city suffers an extreme event and tries to reconfigure both its physical and social systems with the primary aim of reaching an equilibrium state: this means that resilience is focused on social components, since it can be directly related to the citizens, and their level of satisfaction, as sensors (Bozza et al. 2015).

Urban networks should therefore be modeled as hybrid social-physical networks by merging both physical and social components, and are related to social indicators able to characterize the quality of life after a catastrophic event. The integration between physical networks and social networks is particularly useful both in the preparedness phase, representing an effective mitigation instrument for authorities and risk managers, and in the recovery phase since it supports in the selection of the best recovery path (Cavallaro et al. 2014, Bozza et al. 2015).

9. Social city infrastructure

Many cities are subject to natural extremes. As explained before, it is not just the physical features and the concentration of people and assets that make cities prone to disaster. The social city infrastructure and cultural diversities are also of influence. Despite the influence of the structural pattern of a city on vulnerability, few studies have focused on the interrelation between the two. This chapter looks at structural patterns of segregation in cities in relation to vulnerability. The EDUCEN case studies are particularly concerned with people with a mental or physical disability (Istanbul case), immigrants and refugees (Lorca case, Volos case), and poor and low-income households (Volos case). The second half of the chapter therefore specifically considers the vulnerability of these groups.

9.1 Diversity and segregation

Urban places create new and complex emergency challenges concerned with typical city problems such as segregation, socioeconomic deprivation, and inequities in health, well-being, and health care accessibility (Cutter and Emrich 2006). "The most common change in the composition of (mega)city hazard is increased polarization and spatial segregation of groups that have different degrees of vulnerability to disaster'' (Mitchell 1999). In cities all over the world it is clear that poor and rich neighborhoods are diverging with respect to the degrees of risk they are exposed to. Spatial patterns of hazards shift (and exposure increases) as cities grow, Mitchell notes. Spatial segregation is a feature of metropolises all over the world but it does not follow the same geographical pattern in every city. In some cities low-income households tend to live in peripheral areas of the city, while high-income households are more centrally located. In other cities, low-income households are concentrated in city centers, surrounded by suburban areas inhabited by higher income residents.

Spatial segregation is also visible in European cities. Results from a comparison on socio-economic segregation in 2001 and 2011 for thirteen European capital cities for example found that, although levels of socio-economic segregation are relatively modest in comparison to some other parts of the world, social segregation is increasing and social mixing is declining in many areas. Socio-economic inequality is causing people with different incomes in the same city to live farther and farther away from each other. The study found large differences between cities with on the one hand cities as London and Amsterdam respectively strong and moderately segregated, and on the other hand a strong mixing of rich and poor in Vienna due to welfare regimes and housing systems. The main conclusion of the book is that the spatial gap between rich and poor is widening across capital cities in Europe (Tammaru et al. eds, forthcoming).

In several cities ethnicity also plays a clear role as disadvantaged communities with high concentrations of low-income groups are populated largely by ethnic minorities. Clear-cut ethnic/racial divisions are for example found in several cities in the US. The ethnic and socio-economic dimensions of segregation are often linked. Immigrants in West European countries,

especially those newly arrived, are frequently overrepresented among the urban poor (Arbaci 2007). Spatial segregation in cities on the basis of ethnicity/race and/or income has clear relevance for hazard vulnerability and disaster management. Understanding the distributional impacts of natural disasters across income and/or ethnic groups and neighborhoods in a given city is crucial for planning, mitigation and recovery. Improving mitigation and preparedness for natural disasters requires knowledge of how and why certain groups are vulnerable. The distribution of impacts across income and ethnic groups is illustrated in the case of Hurricane Katrina in New Orleans.

Box 8: Class and ethnicity during Hurricane Katrina

Hurricane Katrina was among the deadliest natural disasters in recent US history. New Orleans was characterized by high poverty rates and low wage jobs and one of the poorest cities in the US, with a poverty rate more than twice the national average and a large percentage of the population below the poverty line (Masozera et al. 2006). The city of New Orleans also had a higher percentage of minorities, 72 percent of the population compared to the state average of 36,1 percent. Furthermore, poverty is concentrated among certain groups in society with 84 percent of New Orleans residents living in poverty were African-American. Many residents thus faced multiple layers of vulnerability based on race as well on income. Several studies (ao Logan 2006) found that the neighborhoods of social groups with least resources were most affected by Katrina. The population of damaged areas was nearly half black, living in rental houses, and disproportionately below the poverty line and unemployed. Although the suffering from the storm partly cut across racial and class lines, the odds of living in a damaged area were much greater for blacks, renters, and poor people. Additionally, poor people and black residents are less able to return to their neighborhoods. Data of Logan (2006) shows that whites are more likely to be homeowners and are much more likely to possess the personal resources to rebuild their homes or to find a new place to live. Findings of Elliot (2006) indicate that black workers from New Orleans were four times more likely than white counterparts to lose their jobs after the hurricane, having a long effect on who is able to return to the city and who is not. In conclusion it can be said that economic scarcities intersecting with human ecological factors produced the devastating outcomes. It was a combination of race, poverty and geographical location led to one of the worst disasters in American history.

The combination of a vulnerable population in a high-risk area thus creates the potential for catastrophe, as illustrated in the case of hurricane Katrina.

9.2 Low-income households, immigrants, and people with a disability

Disaster risk and social vulnerability in the city are linked to political interests and struggles over power, both material and non-material (Pelling 2012). Material power lies for example in the contrasting ability of different actors to purchase land or secure housing in the city. An important task will be to examine how power makes certain social groups within the city more disaster-prone than others. To start this process, this section examines what factors make low-income households, immigrants, and people with a disability more susceptible to the impact of hazards. It is important to emphasize that being an immigrant, having a disability, or a low-income does not equal being vulnerable. Furthermore, the same individual or social group may be vulnerable in one phase and not vulnerable in others. In order to distinguish between particular vulnerabilities, a distinction is made between the different phases of disaster; preparedness, response, and recovery.

Poor and low-income households

In a comprehensive review of the literature, Fothergill and Peek (2004) show that poverty influences nearly all stages of the disaster process, including risk perception, preparedness, recovery, and reconstruction. Most of the poor in urban areas have informal livelihoods, work as wage laborers in low-paid jobs or are unemployed. Isolation and lack of social networks often result in weak relationships and fragile bonds.

Preparedness phase

There is consensus that the poor usually occupy the most hazardous sites (Alexander 2000). Moreover, it is sometimes not so much the urban area that suffers but the precarious peri-urban areas into which the poor are living (Alexander 2000). Moreover, low-cost, affordable housing is more vulnerable to disasters and this is precisely the type of housing in which the poor are likely to reside (Rodriquez and Donner 2008). In many places, low- and moderate-income rental houses tend to be older, and thus more vulnerable to disaster. Furthermore, mobile homes, also most often occupied by lower income groups, are the most dangerous types of buildings in a tornado. Those in poverty may be less likely to perform prescribed or necessary actions to mitigate the effects of hazards. For example, Fothergill (2004) found that poorer residents could not afford flood insurance, even though they were aware of its availability and benefits. Another reason for not preparing might be a lack of a sense of personal control over potential outcomes (Vaughan 1995).

Response phase

In their study of warnings and evacuation for Hurricane Andrew, Gladwin and Peacock (1997) reported that people with lower incomes were less able and thus less likely to evacuate. This was mostly due to constraints caused by a lack of transportation and affordable refuge options (Fothergill and Peek 2004). Enarson for example mentions as one of the barriers to avoid harm that 19 percent of all residents in the affected areas did not have a car. Of those who remained, the majority lacked the means to evacuate or sustain themselves during long-term evacuation (Enarson 2007). In addition, people with more money usually have more possibilities to respond by evacuating to a place of choice. They also might have more extensive and more geographically dispersed social networks, allowing them the possibility to reside temporarily with family or friends in safer areas, whereas people with low income may depend more on government assistance in evacuating and might be reluctant to relocate due to a fear of losing their previous standard of living.

Recovery phase

There are also significant differences in the way low-income and poor households and richer people cope with the recovery phase. Poor people around the world suffer the greatest disaster losses and have the most limited access to public and private recovery assets, both in developing societies as well as wealthy industrialized nations (see for example Blaikie et al. 1994, Peacock et al. 1997). Low-income households often lack access to resources and income needed to cope after a disaster. Unequal incomes between Hispanic and Anglo-American communities for example greatly affected the capacity of the victims to afford a permanent

resettlement solution in the aftermath of the 1983 Coalinga earthquake in California (Bolin 1994, Bolin and Bolton 1986 in Gaillard et al. 2008). During the recovery process, people with lower income often have a difficult time as they have less insurance, less savings, fewer personal resources, and suffer from the intensification of previous economic problems (Fothergill and Peek 2004). Furthermore, the ease with which certain groups are able to negotiate bureaucratic systems may be of influence on the success or failure of the recovery process. Higher-income residents might have a better understanding of "how to work the system'' and how to acquire the financial aid they need then lower income residents.

People with a disability

Supporting the focus of the EDUCEN case study in Istanbul, there is limited research on the experiences of people with disabilities during and following a major disaster. disasters. In the majority of planning documents there is reference to disabled people, but they are often just mentioned as members of vulnerable or special needs populations, and there is little acknowledgement of disabled people's heterogeneity (Priestly and Hemingway 2007). The literature suggests that disabled people are more likely to be poor, to live in low income neighborhoods, to live alone or to have high health care needs (Paton 2000, Office for Disability Issues, 2011a; Spence, Lachlan, Burke, & Seeger 2007), all factors that contribute to an increased likelihood of being impacted by disaster.

Preparedness

People with disabilities are often excluded from emergency preparedness policies and planning. The lack of attention to disability-related needs could result in people with a disability left behind in an evacuation or forced to evacuate without vital supports such as medications, mobility devices, or companion animals (Peek and Stough 2010).

For those disabled people who did respond to the earthquake in Christchurch by thinking about how to prepare themselves for future emergencies, some found that the advice provided by Civil Defence was not appropriate to their situation, because it was too general or made assumptions about people's bodies or lives that did not apply to them (Phibbs et al. 2015).

Response

Research reveals that people with disabilities are often unable to respond quickly during an emergency (Chou et al. 2004). In the case of a sudden onset disaster such as a tornado or earthquake, people with disabilities may for example experience difficulties in taking recommended protective actions or escaping. People with mobility limitations may be unable to hike up a hillside or run to an evacuation point. People with cognitive impairments may not recognize the signs of danger (Kales and Enders 2007) or may get confused by emergency signals (Scotti et al. 2007). Studies on people with sensory disabilities such as blindness or deafness suggests that these individuals often do not receive timely warning messages (Philips and Morrow 2007). In the case of Christchurch, disruption to electricity supply, resulting in an inability to watch television or charge cell phones were cited as key reasons for not being able

to access emergency information. Text messaging was a key source of information for people who were deaf while vision impaired people needed to be able to access up-to-date verbal information (Phibbs et al. 2015).

In addition, they encounter difficulties during evacuation. Van Willigen, Edwards, Edwards, and Hessee (2000) found that evacuation rates of households in North Carolina with a family member with a disability were anywhere from 9 to 25 percent lower. These households were more likely to report transportation issues and the lack of accessible shelters influenced their decision not to evacuate (Peek and Stough 2010). Reluctance to evacuate due to concerns that emergency shelters will not be able to meet their needs was also noted by Rooney and White (2007).

Recovery

Most shelters and refugee camps are not accessible and people with disabilities are many times even turned away from shelters and refugees camps due to a perception that they need 'complex medical' services. Insufficient structures to assist disabled people in the disaster response or recovery phases increased exposure to risk. Common difficulties for people with a disability are inability to access support workers, responding agencies that were not set up to cater for the needs of disabled people, and temporary housing and public information that is not disability accessible (Phibbs et al. 2015).

Disruption to physical, social, economic, and environmental networks and support systems affect persons with disabilities much more than the general population. In addition, people with a disability are less likely to have access to the social and economic resources necessary for recovery (Klinenberg 2002) and there is a potential for discrimination on the basis of disability when resources are scarce. In conclusion, the needs of persons with disabilities continue to be excluded over the more long-term recovery and reconstruction efforts, thereby missing the opportunity to ensure that cities are accessible and inclusively resilient to future disasters (UN website on disability).

Immigrants and refugees

Immigrants might be more vulnerable to disasters due to a lack of economic, cultural and social capital[7].

Preparedness

Whereas research has suggested a strong influence of poverty (Fothergill and Peek 2004), wealth and income are just one piece of the vulnerability puzzle, Donner and Rodriguez argue (2008). The possession of "cultural capital'' and "social capital'' might be just as important and these forms of capital can also differ between social groups. Many Hispanics or Asians for example lack cultural capital in the US as they are unable to speak English proficiently. This

[7] More information on the concept of social capital can be found in chapter nine

"linguistic capital'' is a common form of cultural capital and deficits in this capital may have severe consequences in times of disaster. It may for example lead to misunderstandings of warnings. Additionally, social capital may affect the vulnerability of social groups as immigrants may lack community connectedness of influence on warning reception due to their recent arrival (Donner and Rodriguez 2008).

As noted by Rodriguez and Donner (2008), difficulties associated with relocation and adaptation to a new country may be more salient than the disaster risks encountered in the new region. New residents, with or without documents, often face everyday challenges such as finding work, housing, and so forth that outweigh those of less routine events, such as earthquakes, floods or tornadoes. Furthermore, even if immigrants do perceive that they are at risk as a result of a hazard event, they may be reluctant to seek help, particularly if they are undocumented.

Response

The differences between ethnic group's response to natural hazards at different levels of disaster management have been emphasized by several authors (see Gaillard et al. 2008 for an overview). These authors have shown that ethnic groups have different perceptions of risk, are not similarly receptive to information concerning natural hazards, and that some ethnic groups are more reluctant to evacuate. Such differences might be explained by several factors. First, as explained before, there seems to be a frequent overlap between poverty and immigrants/minority groups, leading to difficulties in organizing own transportation for evacuation. Second, language abilities must be considered when conveying important information. When disaster warnings are not provided in different languages, the results can be tragic (see Muniz 2006). Last, unawareness of "mainstream'' disaster subculture can lead to inaction during the response phase. Research by Gaillard et al. tragically illustrates why a disproportionately high number of Gilbertese people died during the Solomon Islands tsunami. Of the 50 people that died, 31 (59.6%) were immigrant Gilbertese that did not recognize the signs of the impeding tsunami because they had no memory or awareness in their culture of such an event (Gaillard et al. 2008).

Recovery

Immigrants do not have the same range of choices and access to help if crisis strikes. The capacity to recover following a disaster particularly depends on access to insurance or the financial ability to rebuild their lives, something that immigrants, in particular recent or undocumented immigrants, often do not possess. Language difficulties might lead to difficulties in applying for disaster relief following a disaster as it obstructs easy access and opportunities to "work'' the bureaucratic system.

Immigrant status problems also come to the fore. After Katrina it has for example been noted that some legal immigrants discovered that they would be out of legal status because they had a pending application for legal permanent residence made on their behalf by a petitioner who died, or they had a work visa tied to an employer or school that no longer existed or became temporarily closed (Rodriguez and Donner 2008). Evacuees may be afraid to contact official

organizations for help because they are afraid that their inability to provide documentation could lead to expulsion.

Interestingly, we found that the literature on immigrants seems to refer almost always to people of other ethnic, racial background than the host society. People coming to live permanently in a foreign country of similar (''western'') origin to the host country are largely neglected in articles on immigrants and disaster, especially in relation to vulnerability. For EDUCEN this might be a point of interest as the inhabitants of several case studies, for example in Lorca, comprise a significant component of immigrant retirees.

10. Cultural and social networks

The connection between physical infrastructure, involving amendments to the physical surroundings and landscape to serve a given purpose (e.g. transportation, supply of electricity, water supply, management), and social infrastructure, refering to the networks and interactions among individuals, groups, and institutions within and outside the community, becomes particularly clear whilst discussing cultural and social networks. This chapter provides examples of how the deliberate and careful planning of community layout and architectural structures may increase social capital. The chapter furthermore looks at definitions and methods for measuring social capital as well as at social network analysis and the use of innovative information sharing in disaster situations through social networks.

10.1 Social capital and DRR: definitions, measurement and policy recommendations

Social capital is typically defined as a function of trust, norms, and networks and is thought to be a key factor in community activities (Joshi and Aoki 2014). The meaning of the concept differentiates considerably among its users (Eraydin, Armatli-Köroğlu, and Uzun 2012). On the one hand, some refer to social capital as something that cannot be identified in an individual, since it stands for networks of norms and trust that are used to achieve shared objectives. On the other hand, others believe that social capital can be studied at an individual level. For them, individuals can acquire social capital purposefully and can transform it in for example economic gain. The ability to do so, however, depends on the nature of the social obligations, connections and networks available to the individual. So both views acknowledge that social capital relates to trust, social norms, obligation and information sharing. Social ties used to link groups and individuals together are referred to as 'networks' (Islam and Walkerden 2014).

A growing body of literature empahsizes the role of social capital in the context of vulnerability, resilience, and disaster management (see those cited in Aldrich and Meyer 2015). The purpose here is to give a brief overview of the theory of social capital and how it could be measured, in order for a more detailed discussion and analysis may follow at later stages. Such a discussion would relate to the relationship of social capital with disaster management, and what could be done by policy makers in this respect.

Social capital, in creating networks, can be subcategorized in three types: bonding-, bridging- and linking social capital (Eraydin, Armatli-Köroğlu, and Uzun 2012, Murphy 2007, Cross 2012, Joshi and Aoki 2014, Aldrich and Meyer 2015, Helliwell, Huang, and Wang 2014). Different case studies demonstrated that the effectiveness of these networks strongly influences the capability to mobilize social capital in order to reduce disaster impacts (Joshi and Aoki 2014, Islam and Walkerdem 2014). Nevertheless, as we will see, the role played by the three kinds of social network change over time.

Bonding relationships are, broadly speaking, inward looking, close, relationships, and hence it is possible to find high levels of similarity. That is, bonding social capital describes, often strong, connections among individuals who are emotionally close, such as friends or family, and may include neighbours and work colleagues as well.

Bridging social capital connects networks to external ones, and is thus outward looking. Bridging social capital often comes from involvement in organizations such as sports and interest clubs, educational and religious groups or political associations. The ties here are more likely to display demographic diversity and provide novel information and resources. Here people may have similar economic status or a political stance, but who differ in factors such as location, occupation, or ethnicity.

Understanding how networks change when stressed, and how to promote positive changes that allow the networks to function during a disaster is therefore of utmost importance. EDUCEN attempts to locate and support the strengthening of networks in cities (bonding capital) while at the same time identifying differences and attempting to provide tools to deal with them (bridging capital) in disaster risk reduction. In the immediate aftermath of the disaster, bonding and bridging networks quickly become relevant. In many cases, spontaneaous and informal network operate more or less cooperatively with trained organizations during the response phase (Vallance and Carlton 2014). Many times people are rescued by the members of their community before the arrival of the official responders. Similarly, the bonding social networks facilitate the sharing of crucial information needed to keep safe during the emergency. Bridging networks are usually active in providing access to additional resources (Islam and Walkerdem 2014). Therefore, delocalization of sections of communities in times of a disaster event, without accounting for the existing social networks, could have a negative impacts on the capability of the community to mobilize its social capital to enhance the recovery phase (Pelling 2012).

As the time after a disaster event increases, bonding and bridging networks perform less well, because of the limited physical and financial resources accessible through these networks. Strong bonding ties may even reinforce an existing system of discrimination. Bridging relationships become less active, and may break down due to competition and conflict over recovery support (see box 9). Bonding relationships often do not break down.

The third type is linking social capital, which connects regular citizens with those in power, that is across explicit, formal, or institutionalized power. Linking relationships are vertical relationships. Finally, linking capital represents a more impersonal form of social capital found within communities. During the reconstruction and rehabilitation phase, affected communities usually need support from institutions through linking social networks. Yet, dynamic evolution of relationships within and between different institutions and between authorities and affected communities often provoke ambiguity about who is perceived as authority in different phases of a disaster event. This, in turn, reduces the level of trust in authority by affected communities.

What the social capital concept emphasises is that community members are active agents rather than passive victims. This provides an important corrective to the predominant top-

down, command and control approach, that often dominates in emergency management (Dynes 2002 in Murphy 2007). Yet, the concept has also been criticised related for supporting the withdrawal of state support for communities and municipalities (Murphy 2007), hence absolving public institutions of their responsibilities (Benadusi 2014). This might have the effect of reproducing a society's pre-existing inequalities.

EDUCEN however does not have this intention. On the contrary, where social capital and networks are strong and helpful in disaster preparedness, mitigation, response and recovery, they should be nourished and maintained[8]. In areas where they are not they can be promoted and strengthened. Acknowledging their importance will allow for enhanced community resilience (Warner and Engel 2014). Decision makers should invest in programs that build bridges across groups in communities and up to those in authority (Aldrich and Meyer 2015).

Measuring/ identifying social capital

Yet, such a stance holds that it should be possible to measure social capital. There are multiple ways to try to measure social capital, but due to the existence of multiple definitions of social capital there is neither a universal method of measurement (Eraydin, Armatli-Köroğlu, and Uzun 2012). Surveys commonly measure general trust as an aspect of social capital by assessing the levels of agreement with statements such as "Most people can be trusted" or "Most people are honest". Shared norms and values are often measured in terms of membership of non-occupational societies, NGOs and clubs and/or the length of time lived in the same neighbourhood and/or the level of involvement in activities organised in and for the neighbourhood.

Interactions with relatives can be used as an indicator of bonding capital. They could be differentiated according to the intensity of interaction per time unit (low, medium and high levels of interaction) and the basis of the dominant form of interaction (social support, financial support and social activities). In order to discover the level of bridging capital, the intensity of interactions per week with friends and neighbours (low, medium or high) and the dominant type of interaction (social support, financial support, social activities or visits) are identified with the help of several questions in the questionnaire survey. Evidence of linking capital, on the other hand, is deduced from the respondents' membership of non-governmental organisations, which enable an extension of the individual's social networks.

Resilience research and disaster management practice have yet to fully embrace social capital as a critical component (Aldrich and Meyer 2015). One of the few organisations that have done so is the Australian Red Cross. They have developed a manual on social capital in the disaster context (Cross 2012). In this report they stress, for (affected) communities, the role that local community leaders can have in driving the recovery effort. These leaders can provide a point of signalling for other individuals and can provide a point of connection between local residents, and external governing and organisational bodies. For non-governmental organisations they stress the importance of actively involving communities and individuals in the planning and implementation of their own support systems. By facilitating skills development at a community level in areas such as social support, organising groups, holding

[8] Important to keep in mind here is that in some situations social capital might support practices that are perverse

meetings, writing grant applications and lobbying, organisations can better allow communities to act to their own cause. Furthermore, by employing locals and utilising the input and skills of specific professionals throughout the community, organisations keep solutions local, while simultaneously fostering local business and economic activity. For the government they state that the most essential action they can take in aiding communities to overcome a crisis, is to support and inform positive decision-making on the ground, while ensuring federal responses do not erect roadblocks to competent local leadership.

The various methods use existing networks and community activities as spaces for incorporating disaster issues and resilience actions or create whole new networks and activities focused specifically on the disaster topic. Some of these interventions include focus groups, social events, time banking and redesign of physical and architectural structures to maximize social interactions (Aldrich and Meyer 2015). The latter two need further elaboration.

First, the practices of time banking and community currency provide incentives or rewards for those who volunteer. In exchange for an hour of labour, for example in a communal garden or at a school, participants can receive an hour of moving aid or currency redeemable at local merchants.

Second, the deliberate and careful planning of community layout and architectural structures may increase social capital. Interaction can occur in areas where residents can meet and spend time—however short—together. Coffee shops, bookstores, bars, hair salons, public squares, and libraries serve as places for social capital to be generated and regenerated. Other environmental effects on social capital include incorporating spaces or activities that encourage community members to participate in their maintenance. Communities where residents feel connected to their space and to their neighbours have lower rates of crime and higher levels of bridging social capital.

Box 9: Trust and clientelism after a state disaster response in Italy

In 1980 an earthquake struck two southern Italian regions, Campania and Basilicata. The poor accountability of the local administration at a time of profound reconstruction affected local communities. New perceptions of injustice and inequality led to a breakdown of community ties and lower levels of trust. This resulted from clientelist practices within the administration that caused the intervention to be perceived from two opposite sites. For some people that for example did not own a house, but had contacts with local government officials, the state intervention was an opportunity for enrichment, while for others, who did own one, it was yet another trauma, since after already having lost family members they were told they could not get compensation by the state (for an elaborate discussion of the case see Caruso 2013)

10.2 Social network analysis and mobilization in DRR

There is growing awareness that, in order to effectively mobilize the social networks in case of disasters, tools and methods to fully comprehend the complexity, the ambiguity, and the dynamic nature of the different social networks are required.

Social network analysis (SNA) can help understanding how and why the actors behave the way they do, through the analysis of structural patterns of relations. Moreover, it provides valuable insights to ambiguity in problem understanding and framing, and how uncertainty is dealt with. The basic assumption behind the role of social network analysis in disaster risk reduction is that the structural patterns of relations in networks influence the social processes (Borgatti and Foster 2003). Social network mapping can support the identification and analysis of barriers to cooperation and collaboration (Bodin and Crona 2009).

Networks topologies can be analysed at the node-level focusing on institutions or actors. The centrality of an actor allows analysis of the role she/he can play in the network as a bridge that connects the others. These actors facilitate the flow of knowledge and information within the network. Central actors can be potential agents of change, facilitating the adaptation to emergence situations.

Although the literature on SNA is well-developed, there are few examples of SNA application in disaster risk management. Nevertheless, there is consensus on the role that SNA could play in revolutionizing the way organizations and communities prepare and respond to disasters. SNA allows to analyse and predict the impacts of information and activities on individuals and the network as a whole for different scenarios and options. SNA could be an important tool to understand how part of the community works or could work together to plan for and respond to disasters.

The ability to visualize interactions within and between community networks promotes situational awareness, rigorous coordinated planning, and the optimal allocation of resources necessary for disaster preparedness, community resilience and response.

It is essential that network models be constantly updated. SNA tools should provide practitioners quick visualization of the changing nature and uncertainties in linkages within and between networks (Cao et al. 2007). This would allow more effective diffusion of information during all stages of the disaster cycle.

Part III of the report discusses the characteristics and potentiality of multiple SNA tools.

10.3 Innovative information sharing through social networks

During natural disasters, each community has particular vulnerabilities and conditions that are impossible to take into consideration a priori and, frequently, information fails to reach communities and/or it is not-specific to the community context (Adger et al. 2012, Cavallo et al. 2014). In this sense, communication is an essential component of disaster planning,

response, and recovery (Houston et al. 2014). Due to the high level of uncertainties during emergencies, people's dependency on the media tends to increase and often their influences are intensified (Lowrey 2004, Chen et al. 2015). Risk related information needs to be publicly disseminated through networking and viral media rather than being delivered through top-down processes (Cavallo et al. 2014) and the use of innovative information sharing through social networks can take specific roles in settings of disasters.

Information and communication tools are vital in organizing emergencies and population response, and in the accurate and prompt monitoring of disasters (Rao et al. 2007, Ashish et al. 2008, Teodorescu 2014). From empirical observations, it is possible to recognize that communication channels during times of crises and natural disasters play a vital role before, during, and after these events. Specifically, social media (SM) have become important channels for the improvement of the social networks (SN), through their complementary roles to those played by traditional media, with individuals being highly engaged as active producers and disseminators of information (Takahashi et al. 2015). Due to the lack of relevant information in emergency situations, SM offer a form of communication not only within affected areas but also between affected areas and the rest of the world with a twofold task, share information with the passive audience and provide a kind “backchannel communication’’ (Dandoulaki and Halkia 2010, Neuman et al. 2014). What is more, the active role ICT and SM has modified the way many people perceived natural disasters (Chen et al. 2015), changing the patterns of creating, distributing, and sharing emergency information during (Palen et al. 2010; Palen et al. 2009, Shklovski et al. 2010, Starbird et al. 2010, Beneito-Montagut et al. 2013). Thanks to their ease of use and simplicity, SM can provide platforms for rapid detection of natural disasters (Earle et al. 2010), for an efficient delivery of information that raise situational awareness (Vieweg et al. 2010, Antoniou et al. 2013) as well as for coordinating relief efforts (Landwehr and Carley 2014, Takahashi et al. 2015). During recent natural disaster, SM also provide avenues for individuals to make sense of the events around them and for the rest of the world to engage in collective coping (Takahashi et al. 2015). Specifically, previous studies of the use of SM during crises have emphasised important operational (Freberg et al. 2013, Lundgren and McMakin 2013, Veil et al. 2011) and emotional (Al-Sagaff et al. 2015) support roles in communicating the severity of the crisis, updating on the situation, and helping friends and families to connect and provide reassurance about safety (Pennington-Gray et al. 2013). Dandoulaki and Halkia (2010) also identified peer-to peer communication as a core function of SM during a crisis. Sheedy (2011) found that during a crisis, users tend to push information to many users, rather than directing it towards a specific user, to bring a community together and allow its members to express their emotion (Al-Sagaff et al. 2015). Moreover, the speed and ubiquity of SM have proved effective in exposing the severity of natural disasters and helped to make crises difficult to ignore, increasing the transparency and visibility of governments' handling of natural disasters (Finlayson 2011).

One of the key tasks of emergency managers is to understand the plurality of social networks in an urban environment and how they might require different channels to convey important messages, rather than assuming that a single media source will reach a mass audience.

Case Studies

Regularly, conventional and traditional communication technologies were used by the public and authorities to tackle challenges during the emergencies. It is important to know that conventional technologies proved to still be involved in our everyday lives especially during crises. Besides, new communication technologies offers an advantage over traditional methods and can not only help response agencies provide their services more efficiently and effectively to the public but can also possibly reach a larger part of the population (Papadimitriou et al. 2013) SM, through tools and platforms applied to SN, are characterized by a technical ease of use that facilitates production, exchange and consumption of user-generated content among users (Neubaum et al. 2014), in order to be helpful for disaster relief and mitigation with data collected in almost real-time and processed to produce timely and relevant information (Teodorescu 2015).

Nowadays, several SM sources are relevant when it comes to crises and disaster management and communication, which are summarized by Wendling et al. as follows:

i) Social networking sites (e.g. Facebook) to improve the information sharing and updates as well as coordination between volunteers and emergency services
ii) Content sharing sites (e.g. YouTube, Flickr) to share of pictures and videos for situational awareness in real time, but also for identifying victims or missing individuals;
iii) Collaboration/knowledge sharing sites (e.g. wikis, forums) to enhance dialogues and exchange information; iv) blogging/micro-blogging (e.g. Blogger, Twitter) for an immediate information sharing with feedback possibilities;
iv) Specialized crisis management platforms (e.g. Ushahidi, Crisis commons, Crisis tracker) to map emergencies from an organizational perspective

In this regard, SM and new communication technologies play an important role in the response to the emergency and they are used in various ways in the three main phases of DRR, namely preparedness, response and recovery. Some representative examples are provided in this section, focusing on the ways in which individuals (e.g. affected people, journalists) and organizations (e.g. government, media, NGOs) used SM during a natural disaster.

As Papadimitriou et al. (2013) point out, the 2012 UK floods and the 2013 UK heatwave case studies, occurred recently enough for SM to have played an important role in every aspect of the disaster in a country where most organizations have their own SM pages readily available in case a crisis struck. Specifically, more established means of one-way communication were used by authorities to spread messages in the preparedness phase, in order to educate the public and to inform them of the potential crisis. Comparing to the two UK examples, it is interesting to observe that there were no evidence of the use of new communication technologies in the Xynthia case study (2010), when a storm crossed Western Europe, with Portugal, Spain, France, Germany and Belgium. Specifically, in the in the preparedness phase, French authorities (i.e. “Service Central d’Hydrométéorologie et d’Appui à la Prévision des Inondations” (SCHAPI) part of the Ministry of Ecology, Sustainable Development and Planning)

relied upon traditional communication technologies to inform the public of the imminent danger rather than SM (for more information see the boxes below).

Box 10: UK floods (2012)

WHAT HAPPENED	**Before the event:** The Environment Agency created a Floodline. The website Floodline Warnings Direct (www.environment-agency.gov.uk/flood) is free service that sends direct messages (by telephone, mobile, email, SMS text message or fax) when flooding is expected to affect specific property. **During the flood emergency**: Authorities primarily used SM (Websites, Twitter, Facebook, YouTube, Flickr) for one-way statement (i.e. flood alerts) in the preparedness phase and two-way communication in the response phase. The Environment Agency used Facebook, Twitter, You Tube and Flickr accounts, both to monitor conversations and to warn and inform the public about the situation. People used SM mostly as a way of staying informed of all developments and news about the flooding and to a lesser extent to relay information posted on social webpages maintained by local authorities and other institutional stakeholders. People did not considered re-sharing their content to their own friends.
What EDUCEN can learn	***Success***: this case study demonstrated the usability of SM to make the risk information more accessible and understandable for local communities. The implementation of this innovative technology greatly enhanced the institutions/community interaction. ***Failure***: the use of SM in disaster risk management does not lead automatically to strengthen the social capital. This example shows that people still look at institutions as the most reliable information provider in case of emergency. People seem to have no idea how to make practical use of the information shared within the SM. Efforts are required to elicit this collective intelligence making it usable during emergency.

Box 11: UK heatwave (2013)

WHAT HAPPENED	**Before the event:** The UK Meteorological Office (the Met Office) published messages concerning the heatwave alerts and the associated health risks. It encouraged users to use the website to find out more information to improve public preparedness. It used maps, video and blog post and it also transmitted warnings via email to various organisations (e.g. Public Health England) who would then use e-mail, the Internet, SMS messaging systems, television and radio broadcasts to disseminate warnings and health-related information to agencies and members of the public. **During the event**: The Met Office and The British Red Cross, used official SM accounts (Facebook, Flickr, YouTube, Google+ and Wordpress) to share heatwave-related information. the UK Power Networks, a British Utility company, used SM also as a form of two-way communication with users.
What EDUCEN can learn	***Success***: This example shows the potentialities of SM and other innovative communication technologies to support the preparedness phase. When the emergences could be forecasted well in advance, SM greatly enhance the effectiveness of communication efforts. ***Failure***: This case as well shows that the sharing of information within the community through the SM was rather poor. EDUCEN can learn that in order to activate social capital with SM, issues related to trust in SM still need to be addressed.

Box 12: Xynthia Storm YNTHIA STORM (FRANCE 2010)

WHAT HAPPENED	**Before the event:** Due to the Météo France underestimation of the storm magnitude, the lack of a flooding warning created several problems to the populations **During and after the storm**: The public and the civilians living in the affected areas were able to stay up-to-date daily mostly through traditional media channels (television and radio broadcasts) as well as news websites. These channels were reporting news from the flooded areas and statements made by authorities in order to support the victims (i.e. the National President's announcements of a series of measures). The authorities used SM neither before nor after the disaster as they relied on traditional means: at the time of the storm, they have any SM accounts and were therefore unable to communicate with the local population. Facebook and Twitter were mostly used for the purposes of exchanging information between the populations in the response phase and campaigning for support to the Xynthia victims. Flickr is a very rich repository of photographs for Xynthia but, just like the other SM cases, most of them were contributed after the event.
What EDUCEN can learn	***Success***: This is one of the very few European example in which SM were activated as an alternative information sharing channel within the community. This is an interesting example of bottom-up initiative concerning the implementation of innovative technologies in the disaster management. ***Failure***: the role of SM was neglected by the authorities that still anchored the risk communication strategy to the use of traditional means. The importance of the two way communication flow was ignored.

11. Disaster and emergency management

This chapter introduces the many actors engaged in disaster risk management and emergency management and examine some of the problems inherent in this. The influence of different organizational cultures and the role of the armed forces in disaster management is also discussed.

11.1 Stakeholders in disaster management

During most of the twentieth century, governance was left largely to the central state. This reliance on government control was supported by the assumptions that (central) governments are able to exercise a high degree of control over social processes, and, are also best prepared to represent the 'public good'. The past decades however have seen skepticism towards these assumptions and to the recognition that our societies are far more complex and fragmented. Relying solely on central government control is often incompatible with the societal conditions we face (Zuidema and de Roo 2015). The handling of risk problems has shifted from a traditional state-centric approach with hierarchically organized governmental agencies to multi-level governance systems. Power and responsibility are redistributed 'upward' to supranational bodies, 'sideways' to non-governmental, market and civil organizations and 'downwards' to lower levels of government (Zuidema and de Roo 2015, Renn et al. 2011, Irwin 2008). This implies that a multitude of actors, their perceptions, their knowledge base and value commitments (and political interests) are engaged in processes of risk analysis, decision-making, and disaster management.

The stakeholders[9] usually involved in disaster management are:

- Authorities; Public administrations play a prominent role at all levels during disaster and public servants or elected officials have the ultimate responsibility for making top-level decisions.
- Non-governmental organizations: local, national, and international NGOs may also be involved in different aspects disaster. They may be engaged in disaster risk reduction and in the response phase they may provide emergency and transitional settlement, shelter, water, and sanitation.
- Emergency services; fire, rescue, emergency medical services and law enforcement represent the first institutional response. They, and other emergency responders, might be involved in tackling the emergency on site, warning, evacuation, and communication.
- Armed forces: in some countries, response to disasters is managed by civil defense or civil protection departments dominated by armed forces personnel. Tasks of the

[9] Community is also an/ the most important stakeholder, no intention of neglecting this but this is already discussed in previous chapters how communities prepare or are reluctant to prepare/organize for disaster. This chapter focuses specifically on 'top-down' response to disaster.

armed forces often include operational and logistical support to civilian teams (Carresi et al. (eds) 2014)

The stakeholders are characterized by overlapping jurisdictions and multi-actor alliances that include both traditional governmental actors but also socially relevant actors from civil society, such as industry, science, and non-governmental organizations. This implies the involvement of many actors with different mandates and interests, from preparedness to recovery. At every stage there are different perceptions of what is taking place, in particular by the people affected and by the organizations that get involved.[10]

This diversity between stakeholders can offer both advantages and disadvantages. Institutional diversity can offer advantages when complex risk problems need to be addressed. Risk problems with different scopes can be managed at different levels and a degree of overlap makes non-hierarchical risk governance systems more resilient and less vulnerable. Furthermore, a large number of actors facilitates experimentation and learning, Renn (2008) argues. Disadvantages can be found in the fragmentation of the risk and disaster management process, costly and time consuming collective decision-making, and the so-called paralysis by analysis; the inability to make decisions due to unresolved cognitive and normative conflicts and lack of accountability with regard to multiple responsibilities and duties (Lyall and Tait 2004, Garrelts and Lange 2011).

11.2 Organizational cultures

Organizational culture refers to the climate, learned behaviour, and practices that organizations develop over time. It guides the way people work, the way they communicate, and the values they share (Schein 2004 in Thompson 2012). Culture points to phenomena that are below the surface, but that are powerful influences on the organization in important ways. It creates shared values in organizational members and also guides their actions much like an individual's personality does. Culture affects organizations at several levels of operation. For example, disaster management organizations that are focused on technical issues tend to understand crises in technical terms and solutions are sought in the technical sphere. Their culture limits these organizations' assessment of phenomena, which could result in missing signs that are not technically linked (Thompson 2012).

Indeed there are important cultural differences between the stakeholders in disaster management which rely on their system of values and their social relations. The cultural differences between the stakeholders involved in disaster management are found in relation

[10] Important to note is that the organizational picture in case of disaster differs per context. Whereas the organizational picture is complex and fragmented in some countries (France), in other countries almost all aspects of risk management fall under the responsibility of one agency (this is the case for flood risk in England).

to, amongst others, language, training, and resources. The issue of training for example reflects the organizational culture; firemen are trained to deal with fires, the ambulance services treat the injured, and police are trained to manage people. The use of jargon within an organization may also negatively affect the coordination among different actors.

In disaster situations, the 'hierarchical police' (or armed forces), the 'egalitarian volunteers' and NGOs, and the 'fatalistic public' all may have to work together. In the literature, these cultural differences between are largely perceived as an obstacle rather than an asset to effective disaster management. How these differences can lead to problems during disaster response is for example illustrated in the following box 13.

Box 13: Cultural challenges in disaster response

A small fire on the Piccadilly line escalator at King's Cross Underground on the evening of 18 November 1987, resulted in a hazardous flashover, which claimed 31 lives (Scarman Centre, 2002b). Four different "cultures" were mainly involved for the elucidation of this common problem; police, fire service, London Transport (LT) staff, and the passengers – the ambulance service performed well. The police response to the situation was three-fold; first, they quickly discover the nature of the situation; after that, they called for the fire service; and finally, they assumed responsibility for the movement of people in an upward direction, and instructed the LT staff to block the escalators (Scarman Centre, 2002a). The third action proved to be problematic, and the decisions appeared to have been taken by officers independently, without any reference to the fire service, LT staff or senior police officer; it was a problem of communication and authority. On the other hand, the fire service arrived at the scene ten minutes after the first call from the police, and their primary action was to move the passengers in a downwards direction – a complete reversal from the previous instructions of the police – away from the moving fire (Rozakis 2007).

Thus, there are several cultural issues to be considered in relation to disaster operations; the safety culture, risk perception, hierarchy, communication and decision-making, learning and training of the involved groups. These factors have significant effect on the perceptions of organizations regarding themselves and towards disaster management (Rozakis 2007).

11.3 Involvement of the armed forces in disaster management

One of the stakeholders in disaster management with a particular organizational culture of interest to the EDUCEN project are the armed forces. A broad elaboration on military organizational culture is considered beyond the scope of this report but the below section provides an introduction to the armed forces as a stakeholder in disaster management.

From the 1990s onwards, civil and military actors have been operating simultaneously in disaster or conflict situations. The interaction between military and civil societal processes has taken many forms, from operating on parallel processes, sharing of information, to actual shoulder-to-shoulder cooperation (Rietjens and Bollen 2008).

Literature on the barriers and difficulties in civil-military interaction is widely available. Most of these studies however focus on complex emergencies in fragile states rather than on civil-military interaction in response to natural disasters (Tatham and Rietjens 2015). Despite this, there are numerous natural disasters in which armed forces have provided aid and equipment and contributed to a safe environment in which development and humanitarian agencies were able to operate. Examples include the earthquake in Pakistan (2005), the 2004 Tsunami, Hurricane Katrina (2005) and Typhoon Haiyan in the Philippines in 2013.

Increasingly, there is also attention to the role of the armed forces in disaster response within their own national territory. In many of these disasters, local civilian authorities are overwhelmed and call upon the armed forces to provide first aid and logistical support. Armed forces often have unique capabilities for dealing with specific kinds of emergencies, such as toxic chemical spills, which frequently lack in other response organizations.

European (and North American) armed forces have been active in responding to requests by the civilian leadership for assistance. The range of disasters for which military assistance may be required is comprehensive. It ranges from support to local authorities to assist in flood control (Switzerland, Austria, Germany) and firefighting (France, Greece on an annual basis) to providing wide/ranging assistance in responding to major catastrophic events such as earthquakes. The Italian military's response to the L'Aquila earthquake is instructive in this regard (Clarke 2014). Operations conducted by the British Army in response to the flooding in early 2014 in the south and west of England were extensive, with 3000 troops employed in flood relief and another 5000 on standby.

Although the specific tasks that the military can perform are praised, there are also inconveniences in the way the armed forces approach their tasks during disaster, as the below case of the 2009 earthquake in L'Aquila shows.

Box 14. Cultural challenges in military response in L'Aquila

> The earliest actions after the earthquake included the total evacuation of town centers, including the entire historical core of L'Aquila, the first time in modern Italian history that a major city had been completely emptied of its population by government decree. They also involved setting up seven districts based on municipal mixed operation centers. One of the principal tasks of these was to set up and manage the 171 tent camps that were established for homeless survivors and provide safe, secure environments for them. Two of the districts were managed by military commands and in these locations the local populations protested that the military had overreached themselves in maintaining security to the extent that the rigid regulations and tall fences around the camps made them seem like prisons (Alexander 2010).

The military is a critical factor in responding to disaster and the growing engagement of the armed forces in disaster response in Europe emphasizes the importance of considering the military in the culture-disaster nexus in EDUCEN case study areas. The civil-military interface

and military organizational culture in relation to disaster will be discussed in more detail in the course of the project.

11.4 Taking account of culture at the grassroots

Besides having to take into account differences in their own organizational cultures, the stakeholders in disaster management also need to take account of the culture of the affected people. In order to reduce risk effectively, the different organizations in disaster management need to understand how to communicate and act in a way that takes account of the perspectives, behavior, attitudes and understandings of reality, - the culture-, of the affected people (IFCR World Disasters Report 2014).

The key to effective performance in disaster risk management and emergency management and ensuring incorporation of culture and risk perceptions of the affected people lies in community participation (Pandey and Okazaki 2005). Interventions by stakeholders have however often been criticized for not taking into account local contexts, especially the affected people's culture (IFRC World Disaster Report 2014). Top-down approaches are oftentimes used to manage the consequences of disasters with decisions coming from authorities and actions based on their perception of the needs, the communities serving as mere "victims'' or receiver of aid (Carresi et al. 2014).

Recent years have seen efforts by governments, international communities, and donor agencies to include and ensure community participation in disaster risk- and disaster management. The community, as the primary stakeholder and directly impacted by disasters, is often not given the chance to participate in whole cycle of the decision making process and implementation of activities. Although community empowerment programmes related to disaster mitigation might achieve their objectives, these are often short term and issues of sustainability are rarely addressed. Many disaster management programs therefore fail to be sustainable at local level after the completion of such projects. In order to increase sustainability, community participation is required in risk assessment, mitigation planning, capacity building, and participation in implementation and evaluation (Pandey and Okazaki 2005).

Cook suggests that it appears that acceptance of local knowledge is easier for decision makers than is meaningful participation. Much of the academic debate concerning participation emphasizes "why'' it should be done, and the "benefits'' of doing it, he argues, but less consideration is given to the decision making systems into which participation is being inserted (Cook 2015). In addition, attention to community participation in disaster management seems to focus largely on the so-called developing world. European examples on community participation are rarely available and the responsibility for risk- and disaster management lies with authorities focusing on technical solutions.

Communication and trust

Communication (risk as well as crisis communication) and trust have come forward as two other important aspects that disaster managers need to take into account in relation to the affected people's culture. Again, from the perspective of disaster managers and in the literature, these issues have been largely perceived as an obstacle to effective preparation, response and recovery for disaster.

Information on hazards and household preparation for a potential disaster can come from multiple sources including school-based education, the media, internet, and community leaders. As suggested by Critchfield et al. (unknown), source credibility affects perceptions of crisis communication and these perceptions of source credibility are culturally based. Research by these authors revealed that individuals in Guyana and New Orleans appear less likely to consider government sources credible whereas in Thailand the government is accepted as a credible source of information. Thus, different audiences can perceive different people to be credible. Recent evidence from the US for example suggests that racial and ethnic minorities tend to hold lower trust in public institutions when compared to non-Hispanic whites (Barnshaw 2006). Indeed, Rodriguez and Donner argue, persistent problems with chronic poverty, unemployment or underemployment, as well as experiences with discrimination and racism adversely impact the trust of minority groups in institutions that need to provide them with assistance, in times of disaster specifically. Cultural differences therefore must be considered in the development of crisis communication strategies. Such mistrust might result in being less receptive to communication messages on disasters from these sources. Source credibility is important to preparing citizens for disasters and allowing timely warning. Moreover, constructing messages is as important as their transmission. For example, technical language or jargon can hinder or confuse the message and risk and warning to the general public has to be communicated in a way that residents can relate to. Warning systems need to be attuned to the cultural and social demands of minority groups. Furthermore, language abilities, culture, and literacy levels must be considered when conveying important information (Critchfield et al. unknown).

Summary Part II

Part II deals with the key topics identified in EDUCEN as relevant to culture and disaster. The section started with a chapter on cultural memory, highlithing the importance for remembering disasters in order to safeguard against the same devastating impact if disaster recurs. The documentation of disasters in the form of for example memorials or high water marks are central to the constitution of culture and, when remembered, memorialised and compared, experiences and remembrance of disasters may inspire the invention of social practices and techniques in dealing with catastrophes. Chapter eight deals with physical infrastructure, involving amendments to the physical surroundings and landschape to serve a given purpose (e.g. transportation, supply of electricity, water supply, management). The chapter explains how a city is shaped by man-made structures, nature, and social, economic, and organizaitonal activities. Land-use and density and accessibility are two factors identified as influencing the risk and impact of a disaster. Which and how land is used has an impact on disaster risk and vulnerabilities, and the case of New Orleans provides a striking example of how governmental decisions on the use of land in a location vulnerable to hurricanes and floods can have devastating outcomes. Density and accessibility refer to the accessibility of help and escape routes, and the presence of open areas in a city. Both are of influence on response and reconstruction in cities. Chapter eight furthermore points to the relevance of cultural heritage for disaster risk reduction. Cultural heritage (material and non material) plays a role in preserving local identity and personality, and local knowledge, and preserving heritage may have educational purposes in awareness raising. The layout of cities, the construction of buildings and infrastructure may reveal how communities mitigated disaster risk.

Chapter nine focuses on social city infrastructure and explores the links the physical and the social. It is emphasized that it is not just the physical features and concentration of people and assets that make cities prone to disaster. The first section of the chapter looks at structural patterns of segregation in cities, stating that spatial segregation on the basis of ethnicity, race, and/or income is a feature of metropolitan cities all over the world. Such segregation has a clear relevance for hazard vulnerability and disaster management, and understanding the distributional impacts of natural disasters across neighborhoods in a city is crucial for planning, mitigation and recovery. The chapter continues with an examination of the specific groups to be focused on in EDUCEN case study areas: immigrants, people with a disability, and low-income households. Literature reveals these categories often overlap, but it is important to recognize that having a low-income household or being an immigrant or disabled does not equal being vulnerable and that these groups are far from homogenous. Nevertheless, these groups have an increased risk of vulnerability in one or more phases of disaster. The chapter examines per ‘group’ what factors may lead to increased vulnerability in the preparedness, response, and recovery phase of disaster.

Chapter ten focuses on cultural and social networks. An overview of bonding, bridging and linking social capital is provided and it is argued that understanding these networks, how they work, how they change when under stress, and how they can enable positive change is of

crucial importantance for disaster management. However, resilience research and disaster management have yet to fully embrace social capital as a critical component. The chapter links cultural and social networks also to the physical environment, explaining that the deliberate and careful planning of community layout and architectal structures may increase social capital. Chapter ten furthermore deals with information sharing through social networks, referring to the vital role of information and communication tools in preparing, responding, and recovering from disaster. Illustrated with several recent examples, the chapter shows that social media have proven their relevance for more efficient service provision by response agencies and reaching a large part of the population in case of disaster. In conclusion, section II illustrated how the city infrastructural system is linked with social and institutional systems, but also with the economic and environmental ones that are all embedded within the urban context and dynamically interact.

Together, chapter eight, nine and ten illustrate how the city infrastructural system is linked with social and institutional systems, but also with the economic and environmental ones that are all embedded within the urban context and dynamically interact.

Chapter eleven deals with disaster and emergency management. First, differences in organizational culture between stakeholders in disaster management are discussed. Emergency services such as the armed forces, the police, and NGO's all rely on their own system of values and social relations and cultural differences are found in amongst others, language, training, and resources. The literature perceives such cultural differences largely as an obstacle to effective cooperation in disaster response. However, it is argued that if understood, cultural diversity might also serve as an asset in disaster management. An introduction is also given to the increasing involvement of the armed forces in disaster management. The chapter continues with the question of how disaster managers take account of culture at the grassroots. It is argued that despite relatively widespread recognition of the importance of the culture of the affected people, many disaster management programs still fail to incorporate community participation in the whole disaster cycle. A literature review revealed that European examples on community participation are extremely scarce, or even non-existent. Communication and trust identified as two important aspects that disaster managers need to take into account in relation to the affected people's culture.

Part III: Policies, Projects and Tools

12. Current state of integration of culture in disaster management

This section provides an examination of the current state of integration of culture in disaster management. First, the main projects on culture and disaster undertaken in the EDUCEN case study areas are identified with specific attention to the themes of the EDUCEN work packages. Second, projects and tools with regard to culture and disaster on international and EU level are examined. Third, a discussion on relevant policy tools is included in this chapter.

12.1 Integration of culture case study areas

Case study partners were asked to identify projects and fill in a table. If no projects were identified it was assumed that EDUCEN is breaking new ground by incorporating culture within DRR designs. The case study partners of Volos, L'Aquila and Milano reported they could not identify projects linked to culture and disasters in their locations. The cases for Istanbul, Umbria and Lorca are reported below.

12.1.1 The Case of Istanbul: culture and disasters

A significant effort in DRR in Istanbul comes from government officials that are responsible for the İstanbul Seismic risk Mitigation and Emergency Preparedness project (ISMEP "mega-project"). Contributions of civil society are limited to community disaster training and the search and rescue domain.

In relation to *culture and memory*, based on an online search, no specific project on "Culture and DRR" has been implemented so far in Istanbul. Thus EDUCEN is probably the first effort to tackle this theme. This changes however if we take cultural heritage protection in the EDUCEN project. There are a number of scientific articles on conservation of cultural heritage that refer to past disasters in Istanbul.

In relation to *culture and networks*, it is hard to define Istanbul's DRR networks, formal or informal. There are temporary activities but there is no continuous (relatively) stable network concerning DRR. The public sector tries to gather the civil society and the private sector within the limits of disaster management plans, for example through consultation and emergency drills. Also, some universities or research units organize colloquiums. These events create some networks and give actors a slight sense of being part of the "disaster community" although it can remain quite anonymous.

The main focus of the Istanbul case concerning *disability, culture and disasters* has not been undertaken so far in the way that EDUCEN intends to do. Until now, the disability and disaster issues have not been approached from the angle of the DRR based on cultural characteristics. Including but not limited to; disabled people taking control of their own training, being trained by disabled people; and how the disabled should assume some roles and duties in the DRR process if possible. EDUCEN will be the first to approach DRR and disability from this cultural perspective.

In relation to *games and simulations,* there are almost no precedents in Istanbul. There are no interactive games or simulations except one mobile application. On the one hand, it appears that “educational parks” are the new trend in Turkey and these are supposed to be interactive but there is still no functional example. On the other hand, there are applications and software for informing users on the latest earthquakes or providing them with guidance on risk mitigation. The “game” planned in the context of EDUCEN on role play would be a complete novelty in Istanbul.

12.1.2 The case of Volos, Milano and L’Aquila: culture and disasters

No previous projects have been identified that specifically target culture and DRR or other specific themes covered in EDUCEN like cultural memory, networks, learning and infrastructure. However, as EDUCEN progresses, it might come to the fore that there have been projects indirectly covering these issues. Thus the assumption that there have been no relevant projects is only a preliminary result. It is important to note that Milano is active within the “100 resilient cities” project. This can provide a useful background and possible entry point for EDUCEN.

12.1.3 The case of Lorca: culture and disasters

There are no specific projects related to "memory of disasters in Lorca". There is however academic literature on the floods that have occurred historically in Lorca. It is also important to note that there is archival media documents which record past flood events such as images of the flood of 1973. Furthermore on 28-30 September 2015, there has been a conference in Madrid on "Emergency and Risk Management in Cultural Heritage: Strategies and Capabilities" with Lorca being the subject of one of the presentations presented at that conference.

There is a European project on meteorological and hydrological forecasting against floods but without any social and cultural component (see. HAREN project on the Forum that was held in 2013). In relation to "learning from disasters" there again has been video footage in the days after the floods of St. Wenceslas, but projects related to this have not been found.

12.1.4 The case of Umbria: culture and disasters

Umbria is a seismic zone. After the occurrence of the 1997 Umbria-Marche Earthquake, there were several projects conducted on these subjects in the Umbria Region. The national INTERREG project that was supported by the EU focussed on how to restore and protect cultural heritage in Umbria after the Umbria Marche Earthquake. Due to the studies in the area after the 1997 Earthquake the Civil Protection System in Italy has been improved. Two other projects that have covered the EDUCEN themes of memory, networks, infrastructure, learning and gaming, are POLIRISPOSTA and a project named POR FESR.

12.2 Projects and policies on European and international level

Projects at European level

There are a number of projects linked to DRR that can be found under both the 7th Research Framework Programme (FP7) and the current Horizon 2020 - Research and Innovation Framework Programme, funded by the European Commission. In particular there are five main relevant projects, four within the FP7 and one in H2020:

a. NMFRDISASTER (Identifying the needs of medical first respond in disasters) (2008-2009), (FPVII)
b. CAPHAZ-NET (Social Capacity Building for Natural Hazards: Toward more resilient societies) (2009-2012), (FPVII)
c. PEP (Public Empowerment Policies for Crises Management) (2012-2014), (FPVII)
d. ENHANCE (Enhancing partnerships for catastrophic risk management Natural disasters in Europe) (2012-2016), (FPVII)
e. CUIDAR (And Cultures of Disaster Resilience Among children and young people). (2015-2018), (H2020)

These projects are based on resilience of the population to DRR, disaster response, disaster management. None of these has a specific link with culture and DRR.

It is important to note however, that an FP project, like CAPHAZ-NET (2009-2012), already recommended further investigation on social and cultural determinants of the perception of natural disasters and application of preventive measures for disaster risk reduction. An overview of the projects that can be related to EDUCEN is given in Annex VI.

The countries that are represented in the EDUCEN consortium have also been actively involved in projects on DRR.

COUNTRY	PARTICIPATION IN PROJECTS
ITALY	7
SPAIN	5
NETHERLAND	3
GREECE	2
POLAND	1
SWEDEN	1

Table 3: Number of DRR projects in which EDUCEN countries are involved

Projects at International level

At the international level, the International Strategy for Disaster Reduction was adopted by the General Assembly of the UN in 1999. UNISDR was set up as the centre to ensure coordination and synergy between the disaster reduction activities of the United Nations System and regional activities.

There are two major milestones coordinated internationally by the UNISDR. The first milestone is the Hyogo Framework for Action: a global instrument signed in 2005 at the Second World Conference on Disaster Reduction by 168 countries it has the aim of increasing the resilience of nations and communities for the period 2005-2015. The second milestone is the Sendai Framework for Disaster Risk Reduction. It was approved by the UN in March 2015 at the Third World Conference on Disaster Reduction and is based on the elements that guarantee the continuity of the work already done by states and other stakeholders from the Hyogo Framework for Action. The members of the agreement want to join efforts to strengthen disaster risk reduction to reduce worldwide, the loss of life and property from disasters. It also articulates the need to improve the understanding of disaster risk in all its dimensions and characteristics. The UNISDR also coordinates the Regional and National Platforms as multi-stakeholder forums aimed at reducing disaster risk.

At the international level it is important to stress that the last 2014 *World Disasters Report* from the International Federation of the Red Cross and Red Crescent Societies (IFRC), focused on culture and risk. In this context the report puts particular emphasis on beliefs (including religion) to kick off the discussion on how to incorporate, and deal with, culture in Disaster Risk Reduction (DRR) and Climate Change Adaptation (CCA).

The report has three specific angles:

-The first is from the perspective of the people that live in hazard-prone locations, and how culture and beliefs mediates with risks faced.

-The second is from the responders perspective, related to organizational culture(s) and local population. In particular when there are potential clashes between formal organizational cultures and community-based cultures.

-The third focuses on the way people think and act from both the responders´ point of view and the vulnerable communities' point of view, i.e. how culture and disaster risk management can work together.

An overview of DRR projects, organisations and initiatives at the international level can be found in Annex VII.

12.3 Policy tools

The focus of EU policies has changed throughout the years. Since the early 1990's, there has been an increase in the participation of civil society in policy and decision making. The EU tries to have a constructive dialogue and collaboration with the civil society in order to have better and smarter regulation and law making (Mysiak, Calliari and Blanco 2014). This increase in more local consideration for policy is not only within the EU, but worldwide. The Making Cities

Resilient Campaign of the UNISDR, focusses on urban and local government, as they are considered the "front line" in DRR (Johnson and Blackburn 2014).

Policy tools that could be used within the EDUCEN project can be divided up into two groups. One group consists of basic policy tools that are useful for framing the issues and analysing the current situation. Recommendations for these kind of policy tools are given in Annex IX. The second group are those that are directly related to disaster management, "soft infrastructure" and culture. These policy tools are more difficult to find as is explained in this sub-chapter.

None of the different EU projects that were mentioned in sub chapter 11.2 use the concept of culture as EDUCEN plans to do. They instead focus on the community and civil society in their policy (Begg et al. 2012, Mysiak, Calliari, and Blanco 2014).

Some recent projects like the PEP do reflect on community and to an extent, culture. For example, in its Roadmap document, PEP states that civil society and community groups are vital for DRR and that they should be included in policymaking in order to increase the resilience of these groups (Vos et al. 2014). PEP supports this argument with the statement that during disasters, most lives are saved by citizens, thus making them a crucial part of DRR. Although the PEP project does not mention any specific policy tools that are related with culture and DRR, they do discuss culture in their Roadmap document. Cultural aspects influence the impact of a disaster and call for specific approaches for the specific situations (ibid).

European projects acknowledge culture as an aspect of disaster management, but so far have not yet approached it as a possible resource for disaster management. EDUCEN will be the first in this, and there are no specific cultural policy tools available yet. Policy recommendation by EU projects focus on community and stakeholder participation. The PEP project recommends emphasizing community approaches, using resilience in all policy levels and exchanging insights in working with civil groups between regions with similar risks (Vos et al. 2014). Although they are not directly related to culture, these recommendations are useful for the EDUCEN project, because they are related to "social infrastructure" which is a considered to be a large part of culture.

Large international organisations that work with DRR like the International Federation Red Cross and Red Crescent societies and ECHO, have a similar focus in their DRR policy recommendations. The strategy of the IFRC on DRR focusses on supporting the community in their own disaster risk reduction, implementing community based programming, and community based measures (IFRC 2007).

In the 2014 document *World Disasters Report* of the IFRC, there is more attention for the "local actor". The "local actor" has no single definition, but will always have a good connection with the local people in the country, and increased access to these people and other difficult to reach populations (IFRC World Disasters Report 2014). According to the report of the IFRC the local actors are not being empowered to play the new role that is expected from them. There is however increased attention to the possible benefits these local actors can bring

during disaster management. The EU department Humanitarian Aid and Civil Protection (ECHO) outlines the EU policy on DRR. Both the official EU policy and the ECHO policy focus on DRR with a community focus and suggest that the resilience should be build bottom up and with attention to vulnerable populations (ECHO 2013).

Both EU projects and international organisations focus on communities and local actors as ways to increase DRR. Local actor/community are seen as a starting point for increasing resilience. There are no specific policy tools recommended that are directly related to culture and DRR. However many of the policy recommendations that are given by the EU projects or organisation can still be used. Their policy recommendations based on "community" or "local actors" are based on aspects and opportunities that within EDUCEN would be framed as, at least partly, culture. Thus the lack of policy tools concerning culture and disaster, could be filled with more specific disaster related policy tools, for example those dealing with assessing resilience and vulnerability.

Vulnerability assessments has been the topic of intensive research and authors have explored whether or not elderly people, home owners, minority groups, women are more susceptible to disaster than others (see Pelling 1997, Cardona 2001, Birkmann 2006a, b, Bohle 2008, Bohle and Glade 2008, Kuhlicke et al 2011). While some case studies did find that certain groups were more vulnerable, others did not. Taking into account the conflicting findings of the case studies, it seems that it is not possible to identify a common set of socio-economic-demographic indicators to explain vulnerability of groups or individuals. Furthermore, the analysis of Kuhlicke et al (2011) reveals that the same individual or group may be vulnerable in one phase of a disaster, and not vulnerable in others. Because of such difficulties in assessing vulnerability based on indicators, these approaches have been criticized as they might give rise to a stereotyped and unenlightened view on people's vulnerability (Buckle et al 2000, Brown and Damery 2002, Handmer 2003, Hewitt 1997). Indeed, there are many 'immaterial' aspects, such as local knowledge, culture, traditions, and norms which intervene in the process of vulnerability formation and are hard to measure, if not unmeasurable at all (Kuhlicke 2010a, Scobolig 2008). This supports the idea that resilience and vulnerability assessment tools can be useful within EDUCEN concerning policy tools. They can be a starting and learning point from where cultural policy tools could be created.

One useful example of a resilience tool is the handbook of the UNISDR project; *How To Make Cities More Resilient* (UNISDR 2012). In the Annex of the report there is a Self-Assessment tool for local governments. Cities that participated in the UNISDR's official campaign; *Making Cities Resilient* used this tool and where evaluated on it. It is still available and large parts of the assessment tool can be used to identify cultural characteristics within the case studies of EDUCEN.

The basic policy tools summarized in Annex IX can already help the case studies to assess their position. The detailed UNISDR resilience tool goes more in-depth in resilience and vulnerability, and although it is focus on local government it can be used to create a more complete understanding of the local cultural DRR characteristics.

13. Social Network Analysis

A method specifically related to social networks is Social Network Analysis. This chapter analyses how SNA tools can help in assessing and identifying cultural aspects and vulnerabilities in different disaster phases. The chapter shows the great potentialities for the integration of these tools into disaster risk management policy and practices.

13.1 Commonly implemented SNA tools

Several tools have been identified in the literature to conduct network analysis that use open-data, raw-text data input – e.g. information from newspaper. With such data it is possible to conduct scenario analysis to simulate what would happen given a certain set of circumstances. The following box describes the characteristics of the most commonly implemented SNA tools.

Box 15: Common Social Network Analysis tools

onasurveys http://www.onasurveys.com: Combines the survey and data analysis tools into one package. And it's online so there is no need to get permissions from IT to install a solution. If there was one hassle it was having to manipulate data from surveys to input into analysis/visualisation tools.

yEd http://www.yworks.com/en/products_yed_about.htm: It's a Java based (cross platform) programme for drawing complex diagrammes, developed by the University of Tubingen. It's not highly sophisticated (a plus), but it's powerful and it's free.
Even given the limitations (losing out on the context and complexity) people appreciated the way it was a springboard for talking about themselves, their relationships and their communication practices.

Netdraw http://www.analytictech.com/downloadnd.htm: It's free, easy to use, and constantly being upgraded. Combined with Ucinet (not free), a very complex and powerful tool.

UCINET6 and NetDraw: The applications can be downloaded for free via the following website: http://www.analytictech.com/

Proximity http://kdl.cs.umass.edu/: Open-source software under development by the Univ. of Massachusetts Knowledge Discovery Laboratory. It is specifically designed for social network analysis and other similar applications.

InFlow I have used InFlow for a few analyses, and once the data file was formatted properly, the GUI was very easy to use. http://www.orgnet.com/index.html. I am not sure of the cost/software licensing etc, as I was using a corporate license that we have.

Pajek Look at Pajek - a social network analysis software. It is freeware. http://vlado.fmf.uni-lj.si/pub/networks/pajek/ There is also a book for this software - de Nooy, W., Mrvar, A., & Batagelj, V. (2005). Exploratory Social Network Analysis with Pajek. New York Cambridge University Press.

AutoMap (www.casos.cs.cmu.edu/projects/automap/) is a product of CASOS at the Carnegie Mellon University and is a text mining tool that enables the extraction of network data from texts. The tool can extract content analytic data (words and frequencies), semantic networks, and metanetworks. The main functions of AutoMap are to extract, analyze, and compare mental

models of individuals and groups, and to reveal the structure of social and organizational systems from texts.

BioWar (www.casos.cs.cmu.edu/projects/biowar/) is a CASOS package that enables community leaders to prepare for biological attacks using computational models of social networks, communication media, disease models, demographically accurate agent modes, wind dispersion models, and a diagnostic error model combined into a single model of the impact of an attack on a city.

Construct (www.casos.cs.cmu.edu/projects/construct/info.html), developed by CASOS, is a multiagent model of group interactions where agents communicate, learn, and make decisions in a continuous cycle. The program takes into account how agents learn through interaction and change their perception of the environment.

DyNet (www.casos.cs.cmu.edu/projects/DyNet/dynet_info.html)is a reasoning support tool developed by CASOS intended to simulate reasoning about dynamic networked organizations under varying levels of uncertainty using computer science, social network, and organization theory.

i2 Analyst's Notebook (www.i2inc.com/products/analysts_notebook/)is a commercial visual investigative analysis tool that allows investigators to organize large volumes of disparate data and conduct link and timeline analyses.

Organizational Risk Analyzer (ORA) (www.casos.cs.cmu.edu/projects/ora/) is a risk assessment tool developed by CASOS that examines network information and identifies individuals or groups that are potential risks to a network given social, knowledge, and task network information.

Palantir (www.palantirtech.com/) is a commercially available information analysis platform for integrating, visualizing, and analyzing structured, unstructured, relational, temporal, and geospatial data for security, intelligence, defense, and financial applications.

Starlight Information Visualization System (starlight.pnl.gov/) is a visualization-oriented user interface for temporal and spatial information analysis and network modeling developed by the Pacific Northwest National Laboratory.

13.2 Discussing the relevance of SNA tools for disaster management

For what concerns the disaster risk management, SNA tools could be implemented to analyse the connections between all the potential emergency responses in a community to specific emergency responders, in order to identify and analyse potential vulnerabilities in a response network (Magsino 2009). The mapping of belief structures and trends over time may allow policy makers to identify where people hold certain beliefs, where beliefs are likely to change, who the critical actors are that enable those changes. The results of the analysis can be used by policy makers and disaster risk managers to determine how best to communicate with the communities in order to enhance the disaster preparedness and improve the emergency management.

Moreover, network analysis tools could be used during the emergency management phase. Network data connects victims and responders to both locations and the needs they mentioned. These expressions can be used to identify critical actors and places that must be reached. To this goal, SNA should be coupled with social media analysis tools, e.g. TweetTracker (Landweher and Carley, 2014). The tools can process the information related to the exchanged messages in order to identify influential social media users, core topics, and changing region of concerns.

Despite these potentialities, SNA are still far from being integral to disaster risk management. Tools are currently available to support the adoption of SNA for disaster communication improvement, and technologies are rapidly evolving. However, many existing tools may be too academically oriented for practical application or are not packaged for the specific needs of the disaster management community. The most effective user interfaces for computer programs could be developed with the full cooperation of emergency management practitioners and an understanding of the practitioners' needs.

Moreover, understanding the nature of the relational network may be not enough. Although a better understanding of network theory can lead to better knowledge of communication processes, disaster risk managers need to understand how to create and distribute a robust message so that the correct message is sent to appropriate networking sites and media. This requires coupling SNA tools with methods better understand issues related to trust in social network. Understanding issues of trust can help practitioners more effectively use social networks to convey their messages. Understanding the processes by which individuals or groups of network members gain trust within their networks to become online opinion leaders is another area to be explored (Magsino, 2009).

The current review shows the great potentialities for the integration of these tools into disaster risk management policy and practices. The translation of theory into practices is still far from being actually implemented. Primary research is still needed on a variety of topics and scales related to disaster management agency responsibilities, community networks, and the interactions between them. SNA tools have not been yet incorporated in models to support emergency management – few examples can be found regarding the epidemic desease. Nevertheless, several examples related to the use of social media and social networks in the different phases of DRR are mentioned in the literature.

14. Games and simulations

The first part of this chapter provides a literature review of the topic of games and simulations, specifically in relation to culture and disaster. The section discusses the relevance of policy exercises and games and explains how these efforts can help experts to understand the cultural factors behind decisions of community members. The section further examines how games and simulations can be used to train communities in disaster preparedness. The second part of the chapter considers ethical and legal issues to take into account with regard to games and simulations.

14.1 Games and simulations in the literature

Decisions based on over-reliance on biophysical data and inadequate appreciation of the diversity of ways, are made at all levels of society and can often lead to policy failures (Sterman 2000). This applies also to the field of Disaster Risk Reduction (DRR), as using relevant science and technology to support local communities at risk, is not fully effective without understanding the social and cultural contexts at the community level. When that understanding is present, achieved through participatory knowledge exchange with these communities, the accessibility, usability and legitimacy of disaster risk information improves dramatically (Visman 2014). However, high costs of gathering data related to how various members of society actually think and decide can often hamper the efforts to work within such an approach. Similarly, scientists and policy makers often must invest years to gain experiences that are critical for managing disaster risk that can change and evolve over time (Sterman 1994). This raises the question: Can we lower the costs of understanding disaster risk socio-cultural contexts through experience? Tools like policy exercises and serious games emerged to fill this gap.

Policy exercises (Duke and Geurts 2004) - also known as open simulations - use social simulation tools that combine computational models and participation of real actors. During policy exercises participants usually assume their real-life roles and operate within their own cultural setups, this way uncovering the nuances on how their decisions are motivated and what are the external factors that influence them. Policy exercises mediate collaboration between actors and scientists in analysing both how problems emerge in complex systems and where points of policy intervention may lie. Mayer (2009), while describing the development of policy exercises over past fifty years, points out that they allow us to capture and integrate both the technical-physical and the social-political complexities of policy problems. Because policy exercises are experienced as something that feels real, more information is retained, learning is faster, and an intuition is gained about how to make real decisions and improve policies. The sophistication of the approach allows even untrained actors to engage in highly complex decisions (Stefanska et al. 2011).

Simulation games and serious role-playing games allow players assuming the roles critical to the success or failure of policy (Harvey et al. 2009). In general, games (both simulation and role-playing) are used to gain better understanding of the roles and positions of the involved actors, and complexity of several types of issues. The complexity of the issues manifests in: several domains (social-cultural, economic and ecological), a number of different actors (often with diverse goals, representing different organizations) and several types of solutions. Depending on their purpose,

games resemble real-life situations to a certain extent. Games that are used to help create policy require detailed information about the issue(s) at stake, the system it is embedded in, and require life-like feedback for evaluating the feasibility of the created policy. Games that are focused on learning might be executed on a more abstract level and allow participants to take other roles than they have in real-life. Participants learn about the complex structure of the problem and interdependencies between actors.

Serious gaming has multiple roots including game theory, drama theories and systems analysis. Game theory analyses human behaviour in situations in which participants have mutual influence on each other, and where the outcome is the result of individual and/or collective actions. Different actors are involved in different parts of the system and have only partial information and resources that are required for a solution. Moreover actors may have different perspectives on the issue. The expected result of a serious game is an improved understanding of a complex issue. This understanding is based on how players deal with the rules, how they interact and how they use their power and resources (Duke 1974). In addition, the result of simulation or role-playing games may provide the foundation for conducting new policies. In a game in which people are assigned roles other than what they perform in reality, they can experience the perceptions of others. This builds better understanding of the positions and values of the others, as the player experiences the consequences of his/her behaviour on others. As a result they are better able to jointly seek for solutions.

Role-playing games are highly flexible and leave room for the demonstration of individual initiative and imagination (Ladousse 1987), which is an advantage in games involving policy making. Serious games have been successfully used as ways to communicate the trade-offs between climate mitigation and adaptation in an urban environment (Juhola et al. 2013). They have also been successful in the contexts of e.g.: social aspects of river floodplain management (Stefanska et al., 2011) and land use related environmental issues (Krolikowska et al. 2007). In the field of disaster relief, Coles and Zheung (2011) provided initial approach for a game theory-based decision support framework for disaster managers, with emphasis on interacting across cultural boundaries. During disaster response, cross-cultural partnership is crucial to establishing a common operating perspective. Lack of communication may lead to less effective use of resources and misunderstanding the objectives. Disaster managers that work in cross-cultural partnerships should know which objectives can be changed or were misunderstood, and which ones cannot be the subject of negotiations. After the operating perspective is created, actors should cooperate to develop the outcome that is optimal for the whole partnership, and this way determine if it is acceptable from the perspectives of singular actors. The potential that singular actors will revise their benefits increases when other actors' points of view and motivations are added to the understanding of the problem that one actor has.

Examples of how policy exercises and games can be applied in disaster planning

Policy exercises and serious games can be applied especially in disaster response planning and training activities, before the real crisis occurs (Walker 1995). Chen et al. (2008) provided an insight on how virtual world platforms can be used in disaster response training and methods to evaluate

these actions. The following environments: Active Worlds (online platform for delivering real-time interactive 3D content over the web), Second Life (famous gaming "sandbox" platform allowing interactions between multiple actors in customized environments) and OLIVE (On-Line Interactive Virtual Environment) were found useful in supporting learning goals. These environments allowed people to perform different roles and exercise emergency guidelines, and also simulate the strategic level, e.g. response to a big flood hazard. MacKinnon and Bacon (2012) presented an augmented/virtual reality environment called Pandora, that was dedicated to perform rich multimedia training. Yamori (2011) proposes games as tools for effective risk communication that support the shift from one-way knowledge transfer (from experts to local citizens) to participatory, collaborative risk assessment and management that includes diverse set of stakeholders.

- An example of using game in such context is the *Crossroad: Kobe* game that was based on actual stories collected from interviews of Kobe city employees following the earthquake in 1995. This game has been used in Japan as a tool for disaster training for local and central government officers, for disaster drills in local communities, and even education for children. The game gained huge popularity - more than 300 gaming session with more than 15 000 participants were conducted (Yamori, 2007).

- Visman (2014) describes *Ready* and *Telephone* participatory games that were used for urban risk reduction, in the slums of Nairobi, Kenya. The *Ready* game helps with identifying the actions that can be taken by local communities in response to a flood risk in their neighbourhood. The *Telephone* game allows improving the communication flow in early warning systems. Both games have helped improve humanitarian programming and decision-making, highlighting the role of provincial administration in risk reduction programming and engaging the meteorological service in early warning system development together with local Red Cross. Such games, tailored to reflect cultural setting of a specific community (with the cooperation of community's representatives and after interviews with them), can be used by disaster responders to test their assumptions and methods before actual intervention in that community.

Game designer Jane McGonigal (2011) suggests that games can show what motivates people to initiate change. This includes both individual and social aspects, and can also be referred to motivations that originate from specific cultural determinants of specific community. Policy exercises and games can be used by disaster planners, trainers and responders as tools for identifying those important cultural factors among the communities they work with. Games that are used with the purpose of bringing change can exploit so-called procedural rhetoric - "the practice of using processes persuasively" (Bogost 2007). This makes the message more transparent, open for investigation and in consequence more easily adopted by the target audience (Walsh, Magnuszewski, Slodka-Turner 2012). Serious games were proven to enable their users to engage in learning activities from which they would otherwise refrain (Wouters et al. 2013). They were also proven successful in enabling people to consider the complexities of their actions (Martin et al. 2007). Games have the ability to reflect complex systems that makes them an effective tool for improving education and cross-cultural communication, among various stakeholders in the field of climate risk management (Bachofen et al. 2012). In the world of information and systems, games can be even perceived as cultural form of systems (Mendler de Suarez, Suarez, Bachofen 2012). They help players understand

and use the diversity of perspectives, and motivate them to think about new, creative risk management solutions (Bachofen and Suarez 2013). As highly-engaging and attractive tools, games, when played during disaster preparedness interventions, can bring added value to the methods already used by trainers and planners.

Policy exercises and games can help the experts understand the cultural factors behind decisions of community members. They can also be used to train the communities to make them prepared for disasters. Games can be adapted to address diverse attitudes, perceptions, behaviour and cultural values and beliefs, within the various communities (Mendler de Suarez, Suarez, Bachofen 2012). A growing number of climate risk management games that are produced by non-profit organizations is available for non-profit use on Creative Commons licenses (Juhola et al. 2013, Bachofen et al. 2012, Bachofen and Suarez 2013, Visman 2014). These games are easy to prepare and use - like, for example, IFRC Climate Centre game materials that can be printed easily using home or office printers (Bachofen and Suarez 2013).

14.2 Ethical and legal issues related to using games and simulations

Policy exercises and games should be accompanied by detailed instructions, tutorials and other training materials. Skilled facilitators are needed to effectively run policy exercises and serious games; in addition, a skilled facilitator is able to run the game within various cultural settings and when implementing games understands the importance of issues like language, literacy, gender, power, cultural differences and attitudes (Mendler de Suarez, Suarez, Bachofen 2012). Facilitation skills are needed also during the debriefing, as it is a crucial part of the gaming experience that turns it into learning (Crookall 2010). Disaster experts, equipped with this toolset of policy exercises and serious games, and trained in relevant facilitation skills, may seek to find new ways to include cultural factors in order to improve effectiveness and efficiency of risk reduction as well as disaster preparedness and response actions.

Emotional aspects

There are many ethical issues that should be considered during running simulations and games. First of all, participants are often not prepared and not aware of what will or what can happen during the activity. Things that will happen can be perceived as dangerous or stressing; they can make the participants feel uncomfortable and, in result, the participants can assess the whole situation as unwanted. Some of the mentioned issues can be avoided by practice of detailed introduction into activity. However, it doesn't solve the issue because, especially in disaster response simulation and gaming, uncertainty is most important experience during the whole simulation (Boud and Miller 1996). An often proposed solution is introducing participants to the game, without explaining the details of activity in a way that doesn't reveal all planned outcomes and possible consequences. The question is whether it is justified to hide particular outcomes to avoid the changes in the experience (that may cause failure to achieve learning results).

This question leads to the issue of the voluntary nature of participation in disaster response simulations and games. Usually, voluntary participation in exercises during training sessions is a basic principle. During disaster simulations and games strong emotional reactions, including frustration, are often caused on purpose. During activities that affect the emotional sphere, unexpected reactions may require a consideration of time to debrief emotions in a safe environment (Crookall 2010).

There is no widely accepted code of ethics for simulation and gaming. There are different codes for specific professional groups like APA (American Psychological Association) or STOP (Polish Association of Non-Governmental Trainers) but it is not clear whether it is possible to construct such a code internationally. It would have to be common for different professional groups using games in the area of responding disasters, or even in the area of simulation and gaming. Nevertheless, the good practice is that before every training that is designed to mislead or trigger anger, fear and other strong emotional responses information about these possible consequences should be provided to participants (APA 2010).

Another ethical consideration to deal with relates to revealing private issues by participants in a professional setting. Deep simulations that lead to self-revelation can break boundaries between the personal and professional spheres, which can also cause embarrassment within the workplace and in relations between co-employees.

Gender and identity aspects

One of the most difficult challenges of facilitating simulation games is managing the gender-related sensitivities. While it is appropriate for an external facilitator to make some top-level observations, he or she should refrain from forcing the discussions on gender-sensitive areas, or when they may trigger repercussions that the facilitator cannot manage effectively. Especially when the domestic violence or prejudicial behaviour is present in the community, the facilitator should be extremely careful when exploring the gender-sensitive areas (Mendler de Suarez et al. 2012). Another issue is incorporating the gender-related inequalities in the game rules. While it can be done, facilitators should be aware which inequalities reflect the inequalities actually existing in the community and which appeared “unintentionally” during the game. In the second case, facilitator should intervene (during the game or in the debriefing), and both cases should be addressed during the debriefing.

Trainer responsibility

Trainer’s responsibility focuses on avoiding the negative consequences mentioned above, being prepared for unexpected and emotional reactions of participants, and providing high-quality debriefing (Kriz 2003). One of the most important facilitator’s task is to create a trusting and open atmosphere among participants. There are many activities and techniques that can be used to achieve this result. Before beginning the exercise it is also important to explain the voluntary nature of participation which, although difficult, is a way to potentially avoid negative emotional consequences.

Often used technique for providing a safe space is a contract (verbal or written) in which learners agree on rules of interactions between them. Rules may evolve around topics like discretion, methods of giving and receiving feedback, or behaviours that will not be accepted like physical and verbal violence.

Providing high quality debriefing is one of the most important trainer's responsibilities. According to the data from surveys of participants, the skills of the facilitator have the highest independent correlation to overall quality of the simulation experience. Debriefing should be done using a specific, proven to work method, e.g. the Kolb Cycle (one of the descriptive models of the adult learning process). Moreover, other techniques that are improving the quality of debriefing are: rewording or rephrasing rather than giving answers, asking one member to comment on another; or asking questions in a number of ways to a number of participants. Carl Rogers described "core conditions" for the facilitative process to achieve quality results. These are congruence (realness), acceptance, and empathy. Realness refers to genuine nature of the facilitator. Acceptance is that the learners feel that their opinions are prized, as are their feelings and their person. Empathy refers to trying to understand the learner's viewpoint and have sensitivity for it (Anderson and Lawton 2009). What also is considered as the trainer's responsibility is ensuring that the physical environment in which debriefing is conducted meets certain requirements. The debriefing should be conducted in a comfortable environment. The seating arrangement may vary with the style of the debriefing and the degree of facilitation intended.

Summary Part III

The third part of the report focused on the identification of projects, policies and tools in the field of culture and disaster that could be of use in the EDUCEN project.

Chapter twelve set out the current knowledge on the integration of culture in disaster management in case study areas. A survey among case study cities proved that in three out of six cases, no projects linking to culture and disaster could be identified. The cases of Istanbul, Volos, and Umbria were able to identify some projects, though no extensive efforts to link culture and disaster were identified in these cities either. The chapter continued with an exploration of projects at European level, identifying five main relevant projects at European level, four within the FP7 and one in H2020. It is important to note however that they are largely focused on topics such as resilience and still lack an explicit cultural component. On the international level, the *Hyogo Framework for Action* and the *Sendai Framework for Disaster Risk Reduction* were identified as key efforts relevant to EDUCEN.

Chapter thirteen discusses the great potentialities of the integration of Social Network Analysis tools into disaster risk management policy and practices. It is examined how SNA tools can help in assessing and identifying cultural aspects and vulnerabilities in different disaster phases and an overview of the most commonly used SNA tools is given. The translation of theory into practice is still far from being actually implemented. The chapter therefore concludes that primary research is still needed on a variety of topics and scales related to disaster management agency responsibilities, community networks, and the interactions between them.

Chapter fourteen looks at the crucial role of policy exercises and serious games in valuing the cultural and social settings in disaster management. Illustrated by examples, it is explained how exercises and games can help experts understand the cultural factors behind decisions of community members, and how games and simulations can be used to train communities in disaster preparedness. The chapter ends with a discussion on the ethical and legal issues to be taken in consideration when running games and simulations. An overview of simple and efficient exercises, games, and simulations to improve disaster risk preparedness and response can be found in the annex.

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Annex I: Methodology of literature review

In order to achieve the main aims of the report, the current systematic literature review set out to:

- Generate a database of relevant articles in the way described here below.
- Read and highlight (or code) the most relevant literature.
- Extract and analyse the highlighted text pieces for patterns, definitions, or stories encountered.
- Write up the findings in the form of exemplary stories that practitioners could identify with.

In this annex these steps of the reviewing process are shortly described.

The extensive search for both academic and grey literature (including amongst others book chapters, academic articles, conference papers, government reports, theses) consisted of multiple search strategies that included both systematic searches in academic search engines and a snowballing technique. The generation of a literature database (the e-library) had as a side effect that consortium members went to an initial 'learning cycle'. Through sharing literature a common understanding of EDUCEN's language and aims started getting shape. The literature database was based on:

- Systematic searches in the SCOPUS database. Titles and article abstracts were scanned and needed to adhere to the search criteria that were the following. First, articles need to trigger a recognition of 'culture' or dimensions thereof. This was done by including, amongst others, search terms like 'cultur*', 'social capital', 'religion' or 'language'. Here the * should be interpreted as a wild card, thus standing for 'cultures', 'culture' or 'cultural'. Second (using AND), articles needed to trigger a recognition of 'disaster' or a somewhat related term. This was done by including search terms like 'disast*', 'catastrophe', 'crisis', 'emergency', 'earthquake', 'flood', 'forest fire', etc. Third, articles, preferably, needed to be describe a European city case. This was done by including (AND) all the names of European countries, (OR) as well as the names of major European cities, names of case study cities, and terms like 'city' or 'urban' . No time limits were set in which the literature should have been published.
- Searches in the Wageningen University Library catalogue, that included more simple searches that only included for example 'culture' and 'disaster'.
- Searches in other institutions that are recognized as relevant in the field of disaster studies, such as the University of Colorado at Boulder and the University of Delaware.
- Conference papers from the "Cultures of Disasters" conference held in Oslo in 2013 and another interdisciplinary conference entitled "Exploring the Links between Disasters and Culture(s): Preparedness, Response, Policies" that was held in Erlangen Germany.
- Snowballing in reference list of relevant articles identified and well-known authors in the field of disaster studies.

The resulting database of articles is available for all partners and can be updated throughout the project time. In addition a 'living document' of key references has been created as a simplified, and ranked, reference list was created.

NLDA and WU, consequently, made a division related to topics to be included in the current report. Articles were loaded into the computer assisted qualitative data analysis software

programme Nvivo. Articles were read and 'coded', amongst others, for questions like 'how does the author (or actor in the article, such as responders, affected community, government etc.) describe the role of culture in disasters management or a particular disaster event?' or 'is culture seen as an asset or obstacle to efficient disaster management?'. In addition, main topics were identified and included in the coding scheme.

After having read, and coded, a number of articles related to topics that would have to be included in the current report on review of the State of the Art, it was possible to extract and analyse thoroughly the (coded) pieces of text identified as relevant. These were used in the reporting of the current review.

Annex II: Working definitions

Culture	The (learned) knowledge, belief, values, art, rules and law, customs and norms, and social structure that people use to comprehend and give meaning to the world around them, and which together form the ''tool-kit'' or repertoire of habits, skills, and styles from which people construct ''strategies of action''
Gender	The socially defined or constructed sex roles, attitudes and values which communities and societies ascribe as appropriate for one sex or the other
Hazard	''A potential threat to humans and their welfare arising from a dangerous phenomenon or substance that may cause loss of life, injury, property damages and other community losses or damage'' (Smith 2013: 11)
Disaster	''a serious disruption of the functioning of a community or a society causing widespread human, material, economic, or environmental losses which exceed the ability of the affected community or society to cope using its own resources'' (UNISDR 2004: 17)
Vulnerability	'the characteristics of a person or group and their situation that influence their capacity to anticipate, cope with, resist, and recover from the impact of a natural hazard'' (Wisner et al 2004: 11). It involves a combination of factors that determine to what extent people, their livelihood, property, or other assets are put at risk by events, or series of events, in nature and society
Risk	Hazard x Vulnerability
Physical city infrastructure	Amendments to the physical surroundings and landschape to serve a given purpose, e.g. transportation, supply of electricity, water supply, management.
Social city infrastructure	Social infrastructure refer to the networks and interactions among individuals, groups, and institutions within and outside the community.
Risk governance	Risk governance denotes both the institutional structure and the policy process that guide and restrain collective activities of a group, society or international community to regulate, reduce or control risk problems.
Disaster risk management	The systematic process of using administrative directives, organizations, and operational skills and capacities to implement strategies, policies and improved coping capacities in order to lessen the adverse impacts of hazards and the possibility of disaster (UNISDR)
Disaster risk reduction	The concept and practice of reducing disaster risks through systematic efforts to analyse and manage the causal factors of disasters, including through reduced exposure to hazards, lessened vulnerability of people and property, wise management of land and the environment, and improved preparedness for adverse events.
Emergency management/disaster management	The organization and management of resources and responsibilities for addressing all aspects of emergencies, in particular preparedness, response and initial recovery steps. Emergency management involves plans and institutional arrangements to engage and guide the efforts of government, non-government, voluntary and private agencies in comprehensive and coordinated ways to respond to the entire spectrum of emergency needs. The expression "disaster management" is sometimes used instead of emergency management.

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Annex IV: Past projects on cultures and disasters in Istanbul

Project or Activity Category	Project / Activity Name	Status	Notes
Urban Infrastructure and Disasters	Istanbul Seismic Risk Mitigation and Emergency Preparedness Project (ISMEP)	Started: 2006 Ongoing, expected to continue until 2019.	ISMEP is a macro scale project that is financed by subsequent loans from international creditors. Called as the "mega-project" in Turkey, its total budget has reached 1.5 billion Euros in 2014. ISMEP is implemented by a special bureau created under Istanbul Governorship, the Project Coordinated Unit (IPCU). The project comprise specific components with respect to the retrofitting, reinforcement or reconstruction of the critical infrastructure (terminated for more than 50 % of public buildings so far).
General Projects of Culture and DRR in Istanbul	ISMEP (IPCU) Project: "Building up an Inventory of the Cultural Heritage-Class Monuments of Istanbul that are Under Responsibility of the Ministry of Culture and the Assessment of their Performance from Multiple-disaster Perspective"	Started: 2006 Terminated: 2008	This project was realized under the Istanbul Seismic Risk Mitigation and Emergency Preparedness Project (ISMEP), which is carried out by the Istanbul Governorship Project Coordination Unit (IPCU). (*)
General Projects of Culture and DRR in Istanbul	ISMEP (IPCU) Project: "Seismic Performance Assessment of the Cultural Heritage-Class Monuments of Istanbul that are Under Responsibility of the Ministry of Culture and Proposal Preparation for their Structural Reinforcement Against Earthquake	Started 2006 (?) Ongoing	This project is a follow-up to the one above. (*)
Memory, culture and cultural heritage and disasters	ISMEP (IPCU) Activity: Workshops and Symposiums for the Protection of the Cultural Heritage (in collaboration with ICOMOS and two universities in Istanbul)	2012 – 2013	These activities gave birth to a "Declaration for the Protection of Architectural Heritage" that is supposed to be the backbone of a future regulation on this topic. These three have been put under two categories, "culture and DRR". and "memory of disasters in Istanbul" category. The monuments in question are certainly "cultural" assets. Or, the way the issue is handled (top-down, bureaucratic approach etc.) may be considered as a "cultural" fact.
General Projects of Culture and DRR in Istanbul	Risk Mitigation and Disaster Preparedness in Kağıthane under Women's Leadership	2015 (terminated)	This project has been initiated by the Foundation for the Support of Women's Work, with funding from Istanbul Development Agency. The aim was to develop basic risk assessment and disaster preparedness capacity of the women in Kağıthane district. This is not a "culture and DRR" project per se, but is required for addressing cross cultural issues, for example, the gender. This foundation has a considerable experience in women-focused disaster relief and rehabilitation.
Memory of Disasters Learning From Disasters	Bosphorus University Kandilli Observatory "Earthquake Park"	Active	This in an interactive training space where children can learn about the basics of risk mitigation and disaster preparedness. This "project" has been placed under 2 categories in the same

			time. Since such "projects" keep the memory of disasters alive and pass it on to the next generations. The educational aspect, on the other hand, is mostly based on lessons learned in previous disastrous events. Yet, this "park" could also be situated under "Culture and DRR" since such activities often aim to build a "disaster culture" in young generations.
Memory of Disasters	Aykut Barka Earthquake Park	"Active"	This is a small recreational area in the Besiktas neighborhood of Istanbul. It has no educational or similar purpose. Aykut Barka was a world-renowned Turkish geologist who has predicted the 1999 Marmara Earthquakes with which his name remained identified. He passed away in 2002.
Memory of Disasters Learning From Disasters	Kadıköy Municipality Educational Disaster Park Project	Started: 2015	Kadıköy is one of the biggest districts of Istanbul. The Municipality is planning to build an interactive educational area on a 2000 m^2 terrain. It's expected to be opened in 2016.
Memory of Disasters Learning From Disasters	Istanbul Metropolitan Municipality Natural Disasters Educational Park Project	Started: 2010 Incomplete / probably cancelled or postponed	In cooperation with Thyssen Krupp, Istanbul Metropolitan Municipality has opened a competition for the plans of a disaster educational park. The winner has been announced in 2011. No further development on the construction has been found.
Memory of Disasters Learning From Disasters	Eyüp Municipality Earthquake / Science Park Project	Started: 2014 Incomplete / probably cancelled	Eyüp is another large district of Istanbul. This project has been announced in 2014. No further development on the construction has been found.
Formal and Informal Networks in DRR	SİTAP – Civil Society Platform for Disaster	Started: 2013 (probably) Ongoing	SİTAP is an initiative by three well-known humanitarian NGOs in the Turkish context. The main purpose ot the platform is to gather all NGOs working on disaster risks, disaster response and relief. Although the number of participant organizations remains very limited, the platform strive to realize regular activities and publish a bulletin every 3 months. SITAP has also a "semi-functional website" with English version. (http://sitap.org/en/)
Existing Games and Interactive Activities	ISMEP Safe Life Project Interactice Disaster E-Training	Started: 2015 Ongoing	This e-training module is accessible online as a part of ISMEP's community disaster training component: "Safe Life". Developed in cooperation with Turkey's leading e-learning company, the interactive application helps high school and university students learn the basics of disaster preparedness. This is the closest thing to a game found. There exist some other IT applications but they are mostly for information purpose, offering emergency and disaster-related information, survival tips, mitigation guidelines etc.
Disability and DDR	"Disabled Persons' Families Volunteer Search and Rescue Team" Project	Started: 2012 Ongoing?	This project has been undertaken by the Municipality of Esenler and the IPCU. The latest data I could find of this action dates to mid-2014. Probably terminated.
Disability and DDR	Disaster Awareness and Preparation for Disabled People	Started: 2006 Probably terminated around 2008	This project has been realized by the Association for Disaster Preparedness and Earthquake Training (Ah-Der), which also produced 4 DRR brochures to cover major disability categories. According to Ah-Der's website, almost 1000 people in total were given training.

Annex V: Past projects on cultures and disasters in Lorca

Topic	Past projects/experts
General projects on culture and DRR	-***Lorca Libre*** **(Free Lorca) financed by the Active Citizenship Programme of the European Finance Mechanism 2009-2014. The Project aims to raise awareness on the Young population from different social backgrounds on the latent or invisible racism, and other types of discrimination** https://www.facebook.com/LORCAFREE **- *Intercultural Dialogue and Active citizenship with the inmigrant population* (Ciudadanía activa y diálogo intercultural con la población inmigrante (DIAMI) where the town hall of Puerto Lumbreras participates.** The main objective of this Project is to build a problem solving network, for issues related to immigrant integration http://www.impefe.es/proyectos-y-programas/diami.html
Formal and Informal networks in DRR	*On 3 bands: meeting spaces 2011* (**A 3 bandas: espacios de encuentro 2011), organized by the Lorca town hall. The project aims to help immigrant women to develop the skills and knowledge needed for their social and work development in society, particularly in two areas: local language and technology. In addition, it aims to favour the integration of immigrant female pupils in neighbour organisations, school and sport groups.** http://explotacion.mtin.gob.es/integralocal/proyectos_detalleProyecto.action;jsessionid=A06CFBD0E4A93720121779FE31380252.vmexpinter55?idProyecto=2107&tipo=2 **MINERVA- Women for integration through education, resource knolwedge and value creation 2011 *(MINERVA: Mujeres para la integración a través de la educación, el conocimiento de los recursos y la formación en valores)*.** It aims to promote the presence and contribution from women to society. Different activities are planned i which local and immigrant women can make contact and receive information, and help, both from their groups but also from the people responsable for the group activities. http://explotacion.mtin.gob.es/integralocal/proyectos_detalleProyecto.action?idProyecto=947&tipo=2
Learning from Disasters	- **I Sessions *Resilient Lorca: lessons learnt from the earthquake* (Lorca resiliente: lecciones aprendidas del terremoto) 26-28 November 2014 in Lorca** http://www.lorcaresiliente.com/ *- Day workshop organised by the Segura river basin agency SEPREM 2013- Water infrastructure for flood protection: experience from the San Wenceslao flash flood* **(SEPREM 2013: Las obras hidráulicas y la defensa frente ala las inundaciones. Experiencia de la riada de San Wenceslao).** http://www.chsegura.es/chs/cuenca/infraestructuras/seprem/ - ***Day workshop organised by the Lorca townhall on Decision making during emergency situations* (Jornada organizada por el Ayto. de Lorca, Toma de decisiones ante situaciones de emergencias): 10/12/2012:** http://www.participacion.lorca.es/noticias/detalle.asp?id=1648
Urban infrastructure and disasters	-Actions undertaken by the Segura river basin agency Demarcation of the Rambla de Biznaga (Lorca)Amongst its objectives is the better evacuation of flood water in the plateau between Lorca and Puerto Lumbreras -Actions by the Lorca town hall: different repair work for urban infrastructure (paths, buildings, etc.). Of all the projects identified (9) only 1 refers to repairing the damage from the last flashflood (Wenceslao) in 2012, and it refers to signalling both vertically and horizontally (see Annex- in Spanish) -Actions by the regional government: repair Works undertaken to repair rural paths damaged by the torrential rain in San Wenceslao through EU FEADER funds. Other actions refer to the construction of sanitation collectors to avoid flooding in some areas/districts in the city, like the channelling of the Rambla of the Señoritas
Games and simulations	

Annex VI: Projects at European level

ACRONYM	TITLE	OBJETIVES	RESULTS
NMFRDISASTER	Identifying the needs of medical first responder in disasters	1) Training methodology and technology used to train medical first responders for disasters.2) **Understanding the human impact of disaster on first responders**. 3) Ethical and legal issues influencing the medical response to disasters. 4) Personal Protective equipment used in Chemical and Biological incidents. 5) Use of blood and blood products in disasters.	Members of the project found it worthy to refer to: Understanding the impact of **cultural diversity on preparedness and response** (both on the responder's side as well as on the community side). EU member states are more and more multi cultural. Believes of the citizens have an important impact on their willingness to be involved in mitigation and preparedness activities, to be active during the response phase. These believe might also play a role in the way responders react during and following a disaster. There is a need to conduct a research identifying the enabling and disabling factors.
CAPHAZ-NET	Social capacity building for natural hazards: Toward more resilient societies	1) identify and assess existing practices and policies for social capacity building in the field of natural hazards and 2) to elaborate strategies and recommendations for activities to enhance the **resilience of European societies to the impacts of natural hazards.**	**Risk perception**, focused so far on technological risks and on the underlying heuristics, values and assumptions that lead to more or less acceptance of novel technologies. There is still a major research need with regard to natural hazards and how **individual, social and cultural determinants influence natural hazard perception**. CapHaz-Net revealed a particular lack of systematic and empirically well-designed research with regard to the connections **between risk perception and people's ability and willingness to apply preventive measures for disaster risk reduction**. One question again refers to European diversity: Are there differences in the perception of trust, responsibility and accountability with respect to authorities and risk managers in different social contexts and European countries? If yes, what implication does this have for risk management and loss prevention?
CUIDAR	Cultures of Disaster And Resilience among children and young people	**Cultural sensitivity is essential to effective disaster management and disaster risk reduction**, yet disaster plans still largely ignore the needs and capacities of children and young people. The 'given cultural group' is therefore children, not viewed as a homogenous group, but one which offers diverse cultural perspectives and diverse experiences of roles taken on in disasters. **By 'culture' we mean more than ethnicity, important though that is; we also refer to social class, vulnerability, age, gender, disability and migration status**. 1) address the exclusion of children and young people from the disaster planning and management process2) provide innovative and creative communication channels for children's voices to be heard and 3) develop a child centred disasters management framework for use by policy/decision makers in participating countries, the EU	ongoing project

		and beyond.	
ENHANCE	Enhancing risk management partnerships for catastrophic natural disasters in Europe	The main goal of the project is **to develop and analyse new ways to enhance society's resilience to catastrophic natural hazard impacts,** by providing new scenarios and information in selected hazard cases in close collaboration with stakeholders, and by contributing to the development of new multi-sector partnerships (MSPs) to reduce or redistribute risk. The main products are a) a harmonised dynamic scenarios of vulnerability, exposure, and hazard at the pan-European scale, using existing information and new probabilistic approaches for multi-hazards, heat-waves, forest fires, floods, droughts, storm surges, and volcanic eruptions; b) guidelines and key features for enhancing MSP interaction in successful resilience enhancement and risk reduction, pre-tested via participatory workshops on risk-based scenarios; c) methods for linking MSPs to novel scientific risk scenarios and assessments; d) a toolbox of economic instruments and non-structural mitigation measures at the national, regional, and local levels developed in a participatory manner and aimed at assessing risk and increasing societal resilience; and e) policy recommendations to the EU and HFA signatories delivered through a dissemination platform for enhancing resilience from high political levels to local communities.	ongoing project
PEP	Public Empowerment Policies for Crisis Management	The aim of the project is to **investigate how the crisis response abilities of the public can be enhanced and to clarify what public empowerment policies are successful in realising these objectives.** A general goal of crisis management is prevention and reduction of harm or damage. This is supported by the communication goals set for citizens: empowerment to act, **social understanding of risks and increased cooperation.** Furthermore, the projectidentifies what public empowerment policies are strong enablers of public resilience. By investigating best practices in educating citizens and working with communities, taking their point of view into account, potential key enablers for public empowerment will be identified and analysed.	If previous experience of crises exists in a certain region, this facilitates risk awareness, but it also **depends on the culture whether this leads to a passive acceptance of the risk or the feeling by people that they can do something about it.** The collective memory may also provide directions for preparedness, and hence storytelling may be one communication strategy that can help reinforce a tendency to act to enhance preparedness. Well-connected societies have created bonds that may be helpful in responding to crises, and in an inclusive society more groups will be included in the process. Community resilience initiatives may seek to strengthen such ties and so increase risk knowledge and skills. Empowerment can be part of the fabric of a society, where people are invited to develop themselves, and the way in which the government is working can also in part be directed to such goals, for example by facilitating participative policymaking on risk prioritization and recovery. Where such an approach is common in various policy areas, it is also more likely to be chosen in the field of risk and crisis management. In the network of multiple response organisations and other actors involved, a co-production attitude can prevail to a greater or lesser extent. If collaboration with publics is part of the mindset, this is an

			important building block for resilience. Such collaboration also needs flexibility, a willingness to look at possible changes in the divisions of tasks and patterns of collaboration in emerging situations.
ELITE	ELICIT TO LEARN CRUCIAL POST-CRISIS LESSONS	The ELITE consortium has a strong representation of experienced **crisis managers and responders** across all phases of crises and of knowledge management experts embedded within a **Community of Practice (CoP)**. The role of the ELITE knowledge management experts is to secure the best acquisition, categorisation, and analysis of tacit, fragmented knowledge acquired by crisis management responders, and to ensure best practice insights. The ELITE CoP is assembled around a web solution comprising a repository of **best practices and guidelines** as well as social media features (ELITE's living document). During the project's lifetime, ELITE uses a holistic method that addresses all relevant phases of major crises along with their systemic relationships. After ELITE's project period, the living document is targeted as a Wikipedia-like solution with the necessary infrastructure and funding system so as to attract and serve the whole spectrum of end-users and crisis decision makers in Europe. Finally, to promote future research on this topic, ELITE will identify major remaining gaps and deliver recommendations for future research.	The major lesson learned in the first workshop was when members of the community met they often started sharing information about new tools and equipment they found effective when dealing with a crisis. Several of the participants brought equipment brochures from the manufactures. Some of the participants brought lessons learned reports, but could not really share them with other participants since most were written in **local languages**. In the second workshop an attempt was made to get the participants to go beyond discussions on equipment used in a crisis. The invited speakers were asked specifically to talk about learning processes. A presentation was given by Edward Pearn about the triple loop learning process (in Van Santen and Illing 2013). Although most of the participants were familiar with the concepts Pearn presented, none of the participants thought that the model of the triple learning process was possible due to **culture and structural conditions of the organisation and systems used in crisis management**. One way that best practices, or to be more precise "minimal practices", are able to be implemented in the organisations is by setting a so called "minimal standards". It seems that the best way to drive change at the organisational level in crisis management is to establish, as a community, a baseline or minimal practices to follow. **The International Search and Rescue Adviser Group (INSARAG) was used as an example of how minimal guidelines can be used to help organisations with the double loop learning process.** Successful learning relies upon a set of rules. The labelling of things may restrict information to particular audiences, whereas the lack of a label may attract a more diversified audience. However, this approach requires **the usage of a language** that everyone understands and types of information that everyone can handle. In addition, idiosyncrasies in information sharing and dealing with its dissemination need to be respected.
MOVE	Methods for the Improvement of Vulnerability Assessment in Europe	MOVE intends to: -create knowledge, frameworks and methods for the assessment of vulnerability to natural hazards in Europe. -use indices and indicators to help improve societal and environmental resilience placing emphasis on clear, capable measurement and accounting for uncertainties. -identify gaps in existing methodologies. -produce a conceptual framework that is independent of scale and hazard type. -analyse physical, technical, environmental, economic, social, cultural and institutional vulnerability measured	The expected impacts of the project were: 1. The development of a standard methodology for vulnerability assessment in Europe 2. The improvement of risk estimation 3. Better promotion of **disaster resilience culture.** The generic vulnerability framework was the most discussed issue in the consortium and the most important product of the project. The generic framework considers the social and the ecological system and it recognizes hazards as being part of the environment. According to the framework, hazards and society coexist and have constant interactions with each other. The framework provides a common structure for existing formulated vulnerability assessment

		for specific hazards and at different geographical scales. -study floods, temperature extremes, droughts, landslides, earthquakes, wildfires and storms.	methodologies. It is independent of scale. Vulnerability essentially refers to the propensity of exposed elements (people and their livelihoods) to suffer damage and loss when impacted by hazardous events. According to the framework the measurement of **vulnerability** is related to the degree of exposure, susceptibility, fragility and lack of resilience. **The framework accepts that vulnerability is multi dimensional (physical, ecological, social, economic, cultural and institutional dimensions).**
RACCE	Raising earthquake Awareness and Coping Children's Emotions	Aiming to palliate the emotional burden and help children cope in case of a serious natural hazard (primarily seismic and secondary volcanic) the project is focused on raising awareness, improving knowledge on earthquakes and simultaneously, educating relative groups (teachers, parents, volunteers and civil protection operators) on the best practices and state of the art responses.	ongoing project
KNOW4DRR	Enabling knowledge for disaster risk reduction in integration to climate change adaptation	The main objective of this proposal is to frame a knowledge management system for **disaster risk reduction** and climate change adaptation that may be considered as a comprehensive reference for establishing, reinforcing, or revising current prevention, mitigation and adaptation strategies. Such knowledge system will embody what has been achieved in different arenas and by **different social groups** in the field of prevention, preparedness and adaptation.	ongoing project
RESILIENCE	Reaching resilience: how to put resilience into practice?	The RESILIENCE project was created due to the belief that **people's capacity to cope with hazards and shocks would be improved if there was greater interaction** between actors involved in the different fields of **Disaster Risk Reduction (DRR), Climate Change Adaptation (CCA) and Poverty reduction (PR)**.	For the RESILIENCE project a series of **local multi-stakeholder workshops** were organised involving the local community, NGOs, local authorities and the private sector to improve understanding of each stakeholder's role in achieving more integrated programmes. The outcomes from these workshop and data analysis helped to improve understanding of the challenges and opportunities involved in reinforcing resilience, and formed the basis for a RESILIENCE toolkit.

Annex VII: Projects at International level

TITLE	OBJECTIVES	RESULTS
Disaster Risk Reduction and Prevention-Armenia	For a decade, UNDP has been promoting investment in disaster risk reduction by: • Supporting the Ministry of Emergency Situations to establish and enhance national disaster management; • Pushing for changes in disaster risk reduction institutional, legal and regulatory frameworks; • Increasing national awareness to promote disaster preparedness and risk reduction; • Building resilient communities through minimizing their exposure to disaster- and climate change-related risks, enhancing the local disaster management capacities and, eventually, introducing a community culture to better understand and cope with these risks, • Implementing small-scale projects to mitigate the risks of disasters in disaster-prone communities.	ongoing project
UNESCO-Education	Education for Disaster Risk Reduction (DRR) takes into account the relationships between society, environment, economy, and culture and their impacts. It also promotes critical thinking and problem-solving as well as social and emotional life skills that are essential to the empowerment of groups threatened or affected by disasters. UNESCO gives specialized policy advice and technical assistance to affected governments, UN agencies and non-profit organizations in reactivating education system in post-disaster situations.	ongoing project
International Centre for Integrated Mountain Development (ICIMOD)	The International Centre for Integrated Mountain Development, ICIMOD, is a regional knowledge development and learning centre serving the eight regional member countries of the Hindu Kush-Himalayas – Afghanistan , Bangladesh , Bhutan , China , India , Myanmar , Nepal , and Pakistan – and based in Kathmandu, Nepal. ICIMOD aims to assist mountain people to understand these changes, adapt to them, and make the most of new opportunities, while addressing upstream-downstream issues. ICIMOD supports regional transboundary programmes through partnerships with regional partner institutions, facilitates the exchange of experience, and serves as a regional knowledge hub.Furthermore, ICIMODstrengthens networking among regional and global centres of excellence.	An e-conference was held in late 2008 to discuss 'culture and risk' or 'understanding the socio-cultural settings that influence risk from natural hazards'. Participants agreed that cultural matters must be taken seriously in risk assessment, and disaster prevention and preparedness. Peoples' concerns and actions or inaction, and the extent and value of local knowledge, are linked to culture. Cultural norms and values influence the readiness to adopt, modify, or reject safety measures offered through outside assistance. However, caution was advised about misreading the real meaning of specific culturaltraits or expressions. Some participants referred to economic, institutional, and political influen ces that can enter cultural systems and become the dominant factors in influencing vulnerability to natural hazard risks. Overall, there was considerable optimism about what can be done to improve safety and knowledge when there is acommitment to cultural understanding. Participants also looked at 'bridging gaps', discussing people's experience of approaches and tools that can be used in contexts where persons of differing cultural backgrounds

		must work together and what has happened in projects and in encounters with communities with distinctive socio-cultural norms, hazards, and settings. Some of the strongest support for cultural sensitivity was not because of how 'lay', local, and traditional cultures can create impediments, rather **participants stressed the negative impact of interveners, officials, or professionals who fail to behave appropriately towards communities at risk**. Some emphasised the problems that arise from ignoring the language and belief systems of others and the danger of failure to respect and earn the trust of vulnerable groups.
Role of religious places in disaster risk reduction in Indonesia	1) establish and strengthen grassroots DRM structures using religious places as a base in disaster prone areas of Indonesia 2)Further strengthen the capacities of existing DMT and DRR network in West Sumatra through an extended training package to fill critical gaps; 3)Explore opportunities for the expansion for the existing network in West Sumatra by engaging additional religious places (if possible) and other actors that are important for the sustainability of religious places led DRR structure in the province.; 4)Establish and strengthen a DRR network in NTB using the existing structure in West Sumatra as a model and provide a full package of training and capacity building; 5) Enhance community awareness and participation in the project by actively participating in the activities of the DRR network such as mock drills and simulation exercises, hazard mapping etc. This will be achieved through and extensive social mobilization and outreach programme and; 6)Identify and undertake necessary mitigation measures to reduce the vulnerabilities of disaster prone communities.	ongoing project

Annex IX Tools and methods for identifying culture

Policy tool	Summary
A Framework for Analyzing Capacities and Vulnerabilities	M. Anderson and P. Woodrow formulated one of the first frameworks for analyzing capacities and vulnerabilities related to disaster events. The tool is written for NGO working in disaster relief and offers the user a simplified analytical framework that will "map" a complex situation, highlight crucial factors and identify the different relationships between factors (Anderson & Woodrow, 1989).
Logical Framework Approach	The Logical Framework Approach is a process tools that can aid to frame and structure project planning and management. It can help to describe a project in a logical way so that it is well designed, objectively described, can be evaluated and clearly structured.
Planning Tools: Stakeholder Analysis	When research and policy mix, it will have an impact on different groups. A stakeholder analysis can help to identify all the different stakeholder groups, and help to engage them into the process.
Organizational Culture Assessment Instrument	The Organizational culture Assessment Instrument (OCAI) is a tool that can map organizational culture. A questionnaire can be filled in online, and from the answers that are given the organizational culture can be analyzed according to four different possible culture types; family, adhocracy, market and hierarchy.
Organizational Culture Model	The Organizational Culture Model is another tool that can define the organizational culture, how members relate to each other, their work and their outside world.

Annex X: Policy exercises, simulations, and games to improve disaster preparedness and response actions

Title	**Crossroad: Kobe**
Description	Crossroad: Kobe is a multi-purpose disaster risk communication tool that was created at the crossroads of the first, second and third modes of risk sense. The game encourages participants to inject their own views in persuading others and negotiating with each other in the scenario reconstructing the Kobe earthquake.
Gameplay	During a game session, a group of five players read 10-20 episodes that are presented on cards one at a time. Each episode describes an actuall dilemma that the veterans of Kobe faced .Individual players are required to make a decision between two conflicting alternatives. Players discuss each episode after each player gets one game point (a normal point) if he/she shares in the majority opinion. The discussion is enhanced by examining support materials, including basic background information and related statistics, expert opinions, and recordings in which Kobe disaster veterans speak frankly about what really happened during that time. An additional game rule allows the only person in a group whose choice differs from the others (single minority) to gain a special point, leading participants to respect a minority view, and encouraging them to seek unique and undiscovered ideas.
Context	Crossroad: Kobe is based on the idea that a gaming approach could make a positive impact on disaster risk communication, especially in prospective planning for long term disaster events.
Target group	Central or local government officers, local people, school children
Benefits	The goal of winning simply helps motivate the players to genuinely consider what they should do: how to rationalize their own choices, how they might persuade others to change their minds, and how to find new solutions.
Applications	Disaster training for central or local government officers, voluntary disaster drills planned by local people, disaster education for children in schools.
Relation to EDUCEN	The game leads the players to become aware of different viewpoints by facing different opinions of other members.
Created by	Kyoto University, Katsuya Yamori
Type	cardgame, discussion game, multiplayer
Number of players	groups of 5 players
Number of moderators	1 per team

Duration	Unknown
Materials	Scenario cards, video footage
Technical requirements	A projector
How to obtain this game	http://www.kyoto-u.ac.jp/en

Title	**DIG (Disaster Imagination Game)**
Description	The Disaster Imagination Game (DIG) is a newly developed method for disaster drill based on the know-how of the Commanding Post Exercises of the JSDF (Japan Self-Defence Forces), it uses maps and transparent overlay. Participants of DIG will be appointed to members of the virtual commanding post of disaster relief activities. By recording various details on maps, participants can easily grasp the situation of affected areas, and also easily discuss how to command relief activities.
Gameplay	1. Lay a large blank map of the community on the table 2. Put several layers of transparent plastic sheets over it. The four edges of the map and one edge of the sheet must be taped to the table so that they don't move. 3. Mark most important facilities in the region on the first layer of the transparent paper (refuge places, hospitals, schools, town hall etc.), you can mark your own house with physical object 4. Flip transparent layer over and mark roads and expressways, rivers and higher grounds with different colors 5. You can choose landmarks, relics and facilities that are town priorities, you can also mark down houses of people with different disabilities , old and sick 6. Draw conditions of predicted damage (for example: cut in supplies, closed roads, cut in electric power 7. On the last transparent layer draw your evacuation plan but remember about conditions and important facilities. 8. Compare map of your safe places with existing map of inundation and other dangers in the region (depending on chosen disaster), discover that not every “safe place” is really safe 9. The participants are supposed to mark many features on the map, using markers and stickers. Through this activity, they find risks and problems that the community has in coping with disasters, and discuss them at the end of the workshop.
Context	DIG was developed in 1997 in Japan based on the CPX (Command Post Exercise) of Japanese Self Defense Force to help communities with disaster prevention and disaster management.
Target group	Community’s members, employees of government and local administration, NGOs, volunteers
Benefits	Exchange of ideas and views of the participants of “DIG” will deepen their understanding on relief activities. The characteristics of “DIG” are: simplicity, participatory, good cost-performance, it stimulates the imagination, and is creative. Not only professionals but also volunteers can enjoy “DIG” without special knowledge, and will be able to manipulate the know-how of “DIG” by

	themselves, by trial and error. DIG will be one of the most useful methods in the "capacity building" for disaster relief of the general public. In addition, DIG will be one of the best ways to facilitate understanding between each other and to build a face to face relationship, the most important factor for disaster relief. Because of different markings, every person in the group can easily participate in the process of imagining disaster and its outcome.
Applications	Small communities and local administration training in disaster prevention and disaster management.
Relation to EDUCEN	Because of the “imagine” element in “DIG”, it is really easy to incorporate element of the cultural, gender differences into the game. You can mark houses of the people who need special help with evacuation as well as sacred grounds that not every citizens will be willing to access etc.
Created by	Takashi Komura, Akira Hirano
Type	in-person game, discussion game, role-playing game, multiplayer
Number of players	unlimited (but best played in groups of 5-10 participants)
Number of moderators	at least 1
Duration	60-120 minutes (depending on number of players and size of the map)
Materials	1. Map of local community 2. Several sheets of transparent plastic or tissue paper 3. Pen, pencil and scissors 4. Cellophane tape 5. Post-it cards 6. Players’ name tags
Technical requirements	-
How to obtain this game	http://www.pref.gifu.lg.jp/bosai-bohan/bosai/bosaitaisei/jishu-soshiki/dig.data/24tebiki.pdf

Title	**Disaster in my backyard**
Description	The game is set in a rainy period; heavy rains of the past days have caused the rivers to burst from their banks. Due to the rising water, residents of the affected area need to be evacuated, some needing assistance (you can change the scenario of a disaster). Authorities are taken by surprise and the participants are called upon to assist in combating the unfolding disaster. They need to manage the information flow, organize the response and assist the affected population.
Gameplay	- The game is played in teams of 4 -6 persons, headed by a team leader based in the control center. Each team gathers points by rescuing victims i.e. safely bringing them to the evacuation center. Certain victims, for example requiring medical attention, are worth additional points but require more effort. The teams are free to decide their own response strategy, for example exchanging information with others teams or applying triage. The game provides teams with real-time information on the status of the scores and the game progress. - Participants are divided into different teams, representing for example different organizations. Each team will appoint a team leader. The rest of the team sets out to aid and rescue the victims, based on the instructions provided by the team leader. - Two centers are used in the game. The team leaders are based in the control center, where they collect and process information, coordinate with others and communicate with their team. Additionally a map is projected, showing the rising water or locations of resources. The evacuation center is a separate location where the rescued are brought in. - Participants can interact with certain elements in-game.Victims are either actors or dummies with a unique profile, detailing their background, their current situation and game-information - Actors take on multiple roles as not all victims are in play at the same time. Key figures are people with skills providing assistance to teams, such as construction workers or the police. The final elements are resources teams need, e.g. medical supplies. - The game can be played at any location with multiple rooms or buildings. A smaller location will increase the intensity of the game but also makes it more demanding for the game managers. Depending on factors such as the available facilities, budget and volunteers and effects can be added to the game to add more realism. These however have no effect on the mechanics of the game itself.
Context	serious game which provides a new way to introduce people to the field of disaster management in general and information management in particular.

Target group	Aid workers, law enforcement service, students
Benefits	- participants are trained in decision making, uncertainty exercises, similar to a real-life scenarios - They learn to make decisions in stressful situations - They acquire knowledge of the action during disasters - the possibility of testing activities in different variants - the possibility of incorporating the professional services assistance
Applications	The game is a great tool for training.
Relation to EDUCEN	Victims have different backgrounds that can be easily modified for the project needs.
Created by	students from the Media, Arts and Design Faculty, Provincial University College Limburg.
Type	simulation game with elements of flash game
Number of players	24 participants, 4 teams
Number of moderators	0
Duration	about 5 hours
Materials	-
Technical requirements	At the heart of the game is the mobile application provided to the participants. This application represents some of the field operations such as providing medical care. The application is connected to a central database from which the game can be controlled and updated. The teams use the app to scan QR codes placed throughout the game. Scanning of QR codes allows teams to interact with the game elements, for instance to examine the status of a victim, apply first aid and register victims in the evacuation center. The devices can also send images to the control center or track the team's location.
How to obtain this game	http://www.iscramlive.org/ISCRAM2013/files/276.pdf https://vimeo.com/52799473

Title	**Extreme Event Game: Coastal City**
Description	"Extreme Event Game: Coastal City" is set in mid-sized coastal city. When a Category 5 hurricane comes barreling up the coast, players must work together to help their neighbors stay safe and send resources where they are needed most as different challenges arise around the city. Players can play using print outs or tablets and laptops.
Gameplay	1. Set up materials and divide players into 6 person groups 2. The facilitator uses a tablet or a laptop to read through the script and send surprise challenges to players as the game unfolds. 3. Each of the six player groups has a tablet or a laptop where they receive information and instructions specific to their group. OR The moderator reads from a printed script to tell the story and announces surprise challenges as the game unfolds. Additional information is displayed on the projection screen, and room-wide sound effects add to the drama.
Context	Content is based on the National Research Council report Disaster Resilience: A National Imperative and has been reviewed by disaster experts. Learning outcomes are based on the 21st century skills framework by the Partnership for 21st Century Skills, as adapted by the Institute of Museum and Library Services. The goal is to teach players what it takes to build community resilience in a face of disaster.
Target group	Coastal cities' citizens, Middle School and High School Students; Teachers; NGO's volunteers, community's members, employees of government and local administration
Benefits	Players learn how to use available resources, respond to extreme events and assess the impact of disaster. Thanks to discussion and need to collaborate with other players, participants may see how important it is to build coalition in the face of danger.
Applications	Education in extreme event preparations
Relation to EDUCEN	The scripts can be expanded with the stories and challenges reflecting needs of specific workshops.
Created by	Koshland Science Museum
Type	in-person game, role-playing game, discussion game
Number of players	12-48 players
Number of moderators	at least 1
Duration	about 60 minutes of gameplay (+15-30 minutes to build setup, depending on version)

Materials	1. Player name tags 2. Resource cards 3. Challenge boards
Technical requirements	a projection screen and speakers, plus a device that can project a PowerPoint file. 7 tablets, laptops, or a combination of both (phones will not work) Reliable Wi-Fi in the game room
How to obtain this game	https://www.koshland-science-museum.org/explore-the-science/extreme-event/plan-your-game

Title	**Gender walk**
Description	The game was designed in order to explore gender dynamics within community. It is a perfect tool to reflect on how adaptation measures can effectively address gender dynamic.
Gameplay	Every participant receives a role in the exercise. Participants are asked to assume these roles for the duration of the exercise. Players are asked to keep their roles secret for the duration of the walk. Participants are then moved to one side of the room. In the next step facilitator reads out the list of questions. If a participant can answer the question with a "yes" , s/he are allowed to take one step forward. Person who gets the furthest wins. In debriefing part participants are asked to disclose their "roles" and reflect on their feelings; reflect on the experience and what this means for planning climate change adaptation strategies considering gender differences and power relations.
Context	Gender differences are often neglected when implementing adaptation projects.
Target group	Disaster managers, volunteers.
Benefits	This exercise is likely to show how important it is to have a good concept about gender dynamics and to include this in the project planning.
Applications	Community members.
Relation to EDUCEN	Relevance for adaptation and DRR processes: Gender differences are often neglected when implementing adaptation projects. This exercise can show how important it is to have a good idea about gender dynamics and to include this in the project planning stage and all subsequent implementation processes.
Created by	Red Cross Red Crescent
Type	Multiplayer game, educational game, role-playing game.
Number of players	As many players as roles the facilitator can provide are allowed.
Number of moderators	1
Duration	20 minutes.
Materials	Small pieces of paper with the roles for participants: villagers (e.g. herd boy, village chief, wife of the teacher, woman teacher, woman Minister of Parliament, male farm worker, women chicken farmer, etc) A list of questions to ask in the course of the walk (please make up your own questions that you consider relevant).

Technical requirements	-
How to obtain this game	http://www.climatecentre.org/downloads/files/Faciliation%20Cards%20rev%202015small.pdf

Title	**Ready!**
Description	It is a physical game which introduces players to the topic of disaster preparedness and disaster risk reduction. It shows an innovative approach to focusing attention on those issues. The game is prepared to be set in a real-case scenarios.
Gameplay	Teams are formed. 1. Facilitator provides the disaster scenario 2. Teams brainstorm actions 3. Teams select 8 priority actions from brainstorm list 4. Teams prioritize actions using beans. Record number of beans assigned to each action in the upper right hand corner of the Priority box 5. Next, facilitator's helper collects beans and sets them aside 6. Teams assign difficulty of action using dice. Record number of dice assigned to each action in the upper right hand corner of the Difficulty box 7. Teams write down their team's name on their cards 8. Facilitator's helper places actions around the game space with the number of dice assigned to that action 9. Facilitator provides instructions on rules of game playing (see Facilitation Guidance) 10.Teams discuss their strategy (going individually versus groups to complete actions etc) 11.Facilitator brings teams to a starting line, announces countdown (On your mark, get set, go!) and calls time after 1 minute 12.Once time is up, facilitator calls teams to return with only the completed actions, leave the uncompleted actions where they were 13.Teams tally points by counting the total number of actions they have 'completed', and identify the winner
Context	The game is the result of a collaboration between the Red Cross Red Crescent Climate Centre and Parsons The New School for Design's PETlab, a research group that creates games acting in the public interest.
Target group	Affected community members. The game can also be played with disaster managers, volunteers, branch officers etc.
Benefits	Improving communication skills, disaster preparedness, teamwork.
Applications	Useful as a sandbox for disaster managers and volunteers.
Relation to EDUCEN	Game helps with identifying the actions that can be taken by local communities in response to a flood risk in their neighbourhood. Can be easily adapted to different contexts.
Created by	Ramiro Corbetta with Shaan Sarang with support from Catalina Cortazar Valdes.
Type	Physical game, multiplayer game.
Number of players	At least 2 teams, each team of 5-6 players.

Number of moderators	1-2.
Duration	About 30 minutes.
Materials	1. 8 Index Cards per team; each card has 3 blank lines with Team Name, Priority and Difficulty written in the top right corner, next to each line 2. Pens (a few for each team) 3. 20 Beans per team 4. 20 Dice per team 5. Timer 6. Prizes for the winning team(s) 7. A volunteer helper familiar with the game
Technical requirements	A large, open space. (20m x 20m)
How to obtain this game	http://www.climatecentre.org/downloads/files/Games/ready/Ready_Rules%20and%20Facilitation%20Guidelinesupdated.pdf

Title	**Stop Disasters**
Description	This disaster simulation game, (from the United Nations (UN) and International Strategy for Disaster Reduction (ISDR) enables players to experience 5 natural environmental hazards (wildfires, earthquakes, floods, tsunamis and hurricanes), by understanding their risks and applying effective methods of prevention and mitigation. The player's role is to plan and construct a safer environment, assess the disaster risk for the environmental disaster hazards, while attempting to limit the damage when natural hazards strike. You are given advice along the way; some will be good, and other will be bad.
Gameplay	1.) Choose scenario (tsunami, hurricane, wild fire, earthquake, flood) 2.) Build and protect your city: 1. Build new houses, schools, hospitals 2. Protect buildings, make upgrades, demolish unsafe houses 3. Manage your city's budget 4. Discover problems with managing city and dealing with natural disasters
Context	Created by ISDR which brings many organisations, universities and institutions together for a common objective: reducing the number of dead and injured by disasters triggered by natural hazards.
Target group	9-16 year old children, teachers, parents
Benefits	Stop Disasters! helps players understand the risk brought on by poor city management. Players learn what type of preparations are necessary to withhold against different natural disasters. Thanks to the engrossing nature of Stop Disasters!, players are encouraged to try every possible disaster scenarios in the game. That results in developing knowledge about disaster preparedness, disaster management and connected problems.
Applications	Children education on disaster management, emphasis is placed on correlation between good city management and reduction of fatalities and costs after natural disaster.
Relation to EDUCEN	Every of the scenarios take place in different place in the world. It shows that people from other countries face different problems and risks, and it is important to know how to prepare for dangers that are the most common in one's own inhabitance area.
Created by	United Nations (UN), Inter-na-tional Strat-egy for Dis-as-ter Reduc-tion (ISDR), Playerthree
Type	single player, online game, flash game

Number of players	1
Number of moderators	0
Duration	10-20 min (depending on difficulty level and chosen disaster)
Materials	-
Technical requirements	Computer with web connection and Flash Player version 7 or higher
How to obtain this game	http://www.stopdisastersgame.org/en/playgame.html

Title	**Story Go Round**
Description	The main goal of this game is to teach local communities how to be creative about managing disasters with locally available resources. “Story Go Round” uses storytelling as a way of approaching disaster management and process of decision-making.
Gameplay	1. Take cards out and shuffle them, set cards on the table 2. For the very first round, the facilitator draws a card from the “Warm Up Round Disaster”* deck and describes the disaster.* 3. The moderator takes one card from the “Time to Prepare” deck and places it on the table face up. 4. The facilitator takes one card from the “Forecast” deck and interprets what the level of severity would mean for that disaster, and tells the players the interpretation 5. Each of the players gets four blank “Things To Use” cards and four blank “Things To Save” cards. 6. Players discuss and try to determine what, in the face of the disaster, might be categorized as “Things To Use” and “Things To Save,” and write (or draw) one item on each of the blank cards 7. The moderator puts players’ cards into respective decks. He/sh sets the “Things To Save” cards in the “Things At Risk” section of the board. Then, he/she shuffles the “Things To Use” cards. 8. After discarding the top 4 cards from the “Things to Use” deck, each of the players are given three “Things to Use” cards. 9. The players have to create a story together using the cards they were given before (10 minutes). After 5 minutes facilitator introduces a “Wild Card. Each player selects one “Thing to Use” card from their hand and places it in the “Things to Use” section. Players describe to the group why they think this item will be useful for in that situation. When the “Wild Card” is played, the players must adapt their story to the new situation. 10. After finishing the stories, the players must take turns acting out their story silently for the other teams (3 minutes per team). 11. After all teams have performed charade, the facilitator rolls the die to see whether the disaster occurred. If the die matches any of the die faces shown on the severity card, the disaster happens. 12. Facilitator asks all the players from all teams to vote for the “winning team” (blind vote)
Context	“Story Go Round” was designed to help bridge the gap between local communities knowledge of the disaster management and the data banks of the Red Cross, by making Vulnerability and Capacity Assessment (VCA) research easier and more engaging.

Target group	Volunteers, NGOs, employees of local administrations and government
Benefits	- Encouraging creative thinking and collaborative planning in communities, and in the face of a disaster - Teaching probability, simulating forecasting, and opening communication about tradeoffs - Creating spaces for discussion of what items to prioritize in disaster scenarios - Creating a picture of the community's capacities for the VCA process
Applications	Educating decision-making in face of the disaster
Relation to EDUCEN	It is easy to incorporate elements of gender and culture into the game. The only limitation is player creativity.
Created by	Jane Friedhoff, Mike Susol, Kelly Tierney
Type	storytelling game, discussion game, in-person game
Number of players	4-30+ total players, when in groups, group should have a minimum of 4 players (including the facilitator), but should not exceed 7 players.
Number of moderators	1 per group
Duration	20+ minutes (for each round)
Materials	Paper (cut into large cards) Die (or other probability counter)
Technical requirements	-
How to obtain this game	http://janefriedhoff.com/images/Story%20Go%20Round%20v1%2005.09.2012.pdf

Title	**The Climate and Gender game**
Description	The game supports learning and dialogue on the different vulnerabilities of women and men facing climate variability and change, using examples of floods and droughts.
Gameplay	1. Setup: 1. Divide separate villages one for each team 2. Organize the players into equal teams (villages) 3. Give each player 3 beans 2. Plant cassavas, maze & beans and rice depending on the amount of rain 3. Buy food for your family if your crops suffer from drought or intensive rainfall
Context	Janot Mendler de Suarez is a Visiting Research Fellow with the Games for a New Climate task force at the Boston University Pardee Center for the Study of the Longer-Range Future, USA. Suarez is collaborating with the Red Cross/Red Crescent Climate Centre, which received CDKN support to develop 'serious games' to raise awareness about climate adaptation strategies.
Target group	Farmers, donors, NGOs, employees of government and local administration
Benefits	Players discover how climate changes affect lives of farmers in Africa and how important gender roles can be on the road to success.
Applications	"Game about planting decisions"
Relation to EDUCEN	Players learn how climate changes affect different genders. Authors noticed how women have more duties toward family and society than men, and thus players taking on female gender roles, have harder start in game. It is often players with male gender roles that win the game which show how important equality can be.
Created by	Red Cross/Red Crescent Climate Centre, Janot Mendler de Suarez, Pablo Suarez
Type	dice game, discussion game, in-person game, role-playing game
Number of players	Unlimited
Number of moderators	at least 1 (assistants are needed)
Duration	about 30-40 minutes (depending on number of players)
Materials	1. Basket 2. 3 cassavas 3. Rice

	4. 2 kilos of beans 5. Enough necklaces for half players 6. Enough bracelet for half players 7. Die 8. Prizes for winners
Technical requirements	-
How to obtain this game	https://understandrisk.org/sites/default/files/files/useruploads/the_climate_and_gender_game.pdf