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Multi-risk Approach in Centralized and Decentralized Risk Governance Systems: Case Studies of Naples, Italy and Guadeloupe, France*

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Recent multi-hazard disasters, such as 2004 Sumatra-Andaman earthquake and tsunami, 2011 Tohoku earthquake, tsunami and nuclear catastrophe and 2013 Super Typhoon Haiyan, showed the need for a multi-risk approach, which takes into consideration multiple risks and interdependencies between them. The first attempts to provide assessment of natural hazards based on multi-risk approach (MRA) exist in science. Also at the level of the European policy-making process, several strategic guidelines were developed to address multi-risk issues. However, MRA is more than assessment of risks for a given territory, it also includes the processes of knowledge transfer from science to policy and implementation of risk mitigation measures in frames of existing governance systems. The European Union is characterized by the multiple levels of governance and variety of risk governance systems, marked by different degree of centralization and decentralization of the decision-and policy-making processes. In this paper we present some results about the impacts of decentralization or centralization on implementation of MRA, with a focus on two case studies, Naples (Italy) and Guadeloupe (France). The methodology of research included several rounds of interactions with stakeholders from practice, such as interviews, workshops, and round table discussions. The results show that both governance systems have their own strengths and weaknesses. Elements of decentralized governance can favour creation of local multi-risk commissions and elements of centralized governance can lead to improvement of interagency communication and creation of inter-agency environment. However, both governance systems suffer from such deficiencies as lack of financial, technical, and institutional capacities at local level. Further research is needed to understand how implementation of MRA can be

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strengthened through multi-risk platforms. However, MRA cannot be a subsidiary to a single risk approach and both approaches have to be pursued.

Keywords: natural hazards, risk governance, institutional framework

Introduction

Multi-hazards disasters, such as the 1995 Kobe earthquake, the 2004 Sumatra-Andaman earthquake, the 2010 Haiti earthquake, and the 2011 Tohoku earthquake, emphasized the need for a multi-risk approach (MRA). These disasters opened floor for discussion that if MRA was applied in mitigation and management of these risks, the consequences would not be so catastrophic.

The Sumatra-Andaman earthquake of magnitude above 9.1 on the Richter Scale caused tsunami, which led to damages in several countries of the Indian Ocean (Stein & Okal, 2005; Titov, Rabinovich, Mofjeld, Thomson, & Gonzalez, 2005). In this region inhabitants were prepared for other natural hazards but not tsunami, neither early warning system was on place, nor tsunami shelters existed. Therefore the damages and human losses were extremely high. This was the deadliest tsunami recorded in history of the region and one of the most devastating events caused by natural hazards in recent years, resulting in almost 230,000 human losses (US Geological Survey, 2005).

Another example, supporting the importance of the adoption of a multi-risk approach, is the Kobe earthquake. Prior to it, the risk mitigation strategies existed but they addressed some risks of natural hazards and failed to address other risks. For instance, the building construction practices in Kobe made use of heavy roofing material in order to make buildings able to withstand heavy winds and to resist typhoons, as the city was suffering frequently from tropical cyclones. Additionally to this, the buildings had only light wood support frame, which was not designed to withstand the earthquake. The heavy roofs and light wood support frames made buildings more vulnerable to other natural hazards such as earthquakes. When the Kobe earthquake occurred, the wood supports were destroyed, the roof crushed the unreinforced walls and floors. This was like a “pancake” collapse. More than 80% of all human losses were caused in the early hours of the earthquake because of the collapse of such houses and buildings, with more than 100,000 houses destroyed (Katayama, 2004).

In the case of the 2011 Tohoku earthquake risk managers addressed the probability of tsunami and of earthquake. The nuclear power plant was constructed on the most stable coast bedrock, thus they mitigated the risk of earthquakes. Another advantage was unlimited availability of seawater for cooling system of the plant. Taken into reference the risk of tsunami, the seawall was constructed. However, the decision-makers underestimated the possible size of tsunami. They located the backup diesel generator, needed for emergency reactor cooling, in the basement, which was flooded and caused the nuclear catastrophe (Komendantova, Scolobig, Vichon, Begoubou-Valerius, & Patt, 2013).

These disasters, as well as the recent Super Typhoon Haiyan, which hit the Philippines in November 2013, show the need to adopt an MRA perspective to assess risks, which is more than the assessment of multiple risks on single risk bases. In fact this approach also takes into consideration interdependencies between multiple risks, which can trigger a chain of natural and man-made events with different spatial and temporal scales (Marzocchi, Newhall, & Woo, 2012; Garcia-Aristizabal, Marzocchi, & DiRuocco, 2013).

The European risk mitigation decision-making process (EU, 2000; EU, 2007; EC, 2010; SEC, 2010) is

recognizing the need of MRA in the form of such incentives as the EU Risk Assessment and Mapping Guidelines for Disaster Risk Management. This document also provides the definition of MRA such as events threatening the same elements at risk without chronological coincidence, or events occurring at the same time or shortly following each other, either independently, or because they are dependent upon one another, or because they are caused by the same triggering event or hazard (COM, 2010). The Council of the European Union underlines the usefulness of MRA to a Community disaster prevention framework (Council of Europe, 2009). The European Union Internal Security Strategy promotes the establishment of a coherent risk management policy, which will link threats and risk assessment into decision-making (COM, 2010, p. 673). Among other risk mitigation measures, the strategy foresees an "all hazards approach to threat and risk assessment". Also the Hyogo Framework for Actions (HFA) of the United Nations International Strategy documents emphasises the necessity of development and strengthening of research methods and tools for multi-risk assessments (UNISDR, 2005).

Besides these documents, the implementation of MRA and its actual use in decision-making processes on the ground is still an open question. The scientific evidence shows that our knowledge about probabilities of multi-risk is increasing but the understanding of how existing governance systems can implement it is only preliminary developed. At the same time, there is ample evidence in the literature that the number of people who are directly or indirectly affected by disasters will continue to increase (World Bank, 2010). This leads to the question, which White, Kates, and Burton (2001) were asking already in their work, namely, if our scientific knowledge on multi-risk is increasing, why do the losses from natural disasters continue to grow? One of the reasons lies in the growth of economic value of assets exposed, that contributes to the increase of vulnerability (Arnold, Chen, Deichmann, Dilley, Lerner-Lam, Pullen, & Trohanis, 2006). Other reasons can be related to the lack of funding and investments in risk research and reduction (Benson & Twigg, 2004) or to the barriers in institutional and governance structures, including barriers for knowledge transfer from science to practice (Kappes, Keiler, Elverfeldt, & Glade, 2012).

The review of EU member-countries to implement MRA, conducted in frames of the 2011-2013 HFA Regional Synthesis, shows that there are still significant barriers for implementation of the results of multi-risk assessments, and that progress in this area was very limited (UNISDR, 2013). This paper focuses on how multi-risk assessment might be implemented in different governance systems, marked by different degrees of centralization in policy and decision-making processes. To approach these issues, it is necessary to take into account not only the existing tools and institutional characteristics for risk assessment but also interactions between different levels of governance systems, such as local, national, and regional; possibilities for synergies in risk mitigation strategies; existing division of interests, power relations and conflicts between the multiple stakeholders involved into risk mitigation. Focusing on case studies in Europe, we aim to investigate different governance systems and examine tensions between rational policy-making, which deploys scientific multi-risk assessments, and pluralist politics, which mediate contending opinions, perceptions, and interests. We compare natural risk governance systems in Italy and France, which are characterized by different degrees of decentralization not only across countries but also across natural hazards in the same country.

Concept of Risk Governance and MRA

Risk governance is a systematic approach to decision- and policy-making processes on natural and technological risks, which is based on such principles as cooperation, participation, and effective risk

management in public and private policies. Its major aim is to reduce risk exposure and vulnerability as well as human and economic losses caused by disasters (Renn, 2008). As governance, in general, refers to actions, processes, traditions, networks, and institutions by which decisions are taken and implemented, risk governance applies the principles of good or sound identification, assessment, management, and communication of risks (IRGC, 2011). In this perspective, sound governance is considered as an essential element to guarantee an integrated approach for natural risk reduction. It applies through a variety of existing risk mitigation measures and policies, as also required by MRA. The elements of sound or good governance such as accountability, participation, and transparency are essential for implementation of risk mitigation strategies. The concept of risk governance is focused on decision- and policy-making processes, including a multitude of stakeholders. It covers formal and informal stakeholders and institutions involved into risk assessment, mitigation, and management. Induced by shocks from natural and man-made disasters, the interest for the concept of risk governance increased significantly during the last years (Verweiy & Thompson, 2006).

MRA is a relatively new field, until now developed only partially by experts with different backgrounds such as engineering, statistics, or various fields of Geosciences. Therefore, there is almost no scientific evidence on the implementation of risk governance concept regarding mitigation of multi-risk of natural and man-made disasters and implementation of MRA exists. However, the International Risk Governance Council (IRGC) summarizes the major challenges for risk governance today. Among them is the slow evolution of governance systems, which causes serious concerns from governments, private sector, and general public about the lack of governance mechanisms to deal efficiently with climate change risks such as natural hazards. Clearly, the question of how current governance systems can address multi-risk of natural hazards depends not only on regulatory framework but also on the capacities of governance systems at different levels, from local to global, to deal with these risks and to entail risk policy and politics (Geels, 2010). The fact that research on governance and political mechanisms for MRA is underdeveloped, may lead to underestimation of the role of local scale in disaster risk reduction as well as of the influence of different, independent scales of governance (Coenen, Erceg, Freedman, Furceri, Kumhof, Lalonde, … & Veld, 2012). A more systemic approach from policy sciences on such topics as complex decision-making and policy-making processes (Meadowcroft, 2007) and government networks with different stakeholders involved (Block, Dovolder, Paredis, Vandevyvere, 2012) is required.

MRA can have several benefits for risk governance such as quantification of potential total risk from multiple hazards, comparing risks from different hazards and return period for a given asset, identification of dominant risks over different time scales, assessment of different spatial patterns of risk from different hazards important for emergency planning, assessment of relative risk arising from different hazards, important for long-term planning by insurance companies and by governments (Schmidt, Matcham, Reese, King, Bell, Henderson, … & Heron, 2011). Generally, interest in MRA increased significantly in Europe during the last 15 years and led to a row of EU funded projects on multi-risk assessments (Garcia-Aristizabal et al., 2013).

However, despite the growing number of scientific works on methodology of MRA, evidence from practice shows that MRA was conducted only for separate regions and cities in Europe (Selva, 2013). In frames of the Principles of Multi-Risk Assessment, Interaction between Natural and Man-Induced Risks (NaRaS) project, multi-risk assessment was conducted for the Casalnuovo municipality in Southern Italy. Located just 13 km away from the crater of the amount Vesuvius volcano, it is exposed to several kinds of hazards such as the volcano, the Irpinia tectonic earthquake source, floods of a river passing through the municipality as well as

the presence of industrial landfills. The local government was interested in identification of the most dangerous hazard and the most effective way of financing the risk mitigation measures. The multi-risk assessment provided local decision-makers with new insights on mitigation of hazards. It showed that volcanic risks overwhelm significantly all other risks in mitigation measures and that interaction between volcanic, industrial, and environmental risks were not taken into consideration, which led to underestimation of these risks (Marzocchi & Woo, 2009). Another multi-risk assessment was conducted for the city of Cologne by the German Research Network Natural Disasters project. The vulnerability of Cologne is marked by a very dense population as well as cultural, industrial, and economic assets. The city is at risk of windstorms, floods, and earthquakes. The multi-risk assessment included vulnerability assessment and estimation of direct losses for sectors such as private housing, commerce and services, industry, energy and water supply. The project also developed a set of scenarios focusing on potentially damaging events from each of three above-mentioned types of hazards. Both these projects provided detailed multi-risk assessment, however they did not really investigate how it could be implemented through exiting institutional and governance structures. Even though they conducted a detailed assessment for multi-risk situations, they did not investigate how the institutional structures could mitigate and manage these multiple risks.

But the reduction of risks cannot be based on scientific knowledge only about natural hazards and their probabilities, since risks also have social dimensions, within which political and governance systems have a strong contribution (Assmuth, Hildén, & Benighaus, 2010) and it is crucially important to bring together knowledge, technology, and actors in the field of risk governance and MRA to achieve more effective natural disaster prevention and mitigation (Fleischhauer, Greiving, & Wanczura, 2007).

In this context, the effects of centralization or decentralization in the governance systems were studied only partially. Former research studies examine the effects of centralization or decentralization of development and implementation of development policies (Jütting, Kaufmann, McDonnell, Osterrieder, Pinaud, & Wegner, 2004), on management of natural resources (Gibson, Ostrom, & Shivakumar, 2000) as well as on public services. In the last decades decentralization became an integrated part of good governance practice promoted by international organizations (World Bank, 2000), and there is also evidence that decentralization itself might become a subject of bad governance practices, especially in terms of transparency, as it provides opportunities for redistribution of funds for local governments dominated by local elites. How successfully the principles of good governance are implemented during the process of decentralization also depends on the existing institutional structures at local level and the division of responsibilities and funds between local and national levels.

However, the topic did not receive much attention in the field of natural hazards until now. Sharma et al. (2012) studied the effects of decentralization on hazard and risk assessment for single risks like landslides. To our knowledge, there is no evidence about the impacts of decentralization or centralization on implementation of MRA. Other research results show that decentralization might have a row of advantages such as: (1) more rapid and more complete assessment of risks in local places, through mapping at an appropriate scale, greater; (2) more transparent communication of risk assessment products, such as maps; and (3) more open, and at times public discourse on how to interpret and respond to the information contained in the risk assessments and maps (Sharma, Scolobig, & Patt, 2012).

Our hypothesis, tested in two case studies, is that even though decentralization can have advantages for risk assessment of single risks, centralization can have advantages when implementing MRA. More precisely the key research questions are: What are similarities and differences between centralized and decentralized risk

governance systems? And what are the strengths and weaknesses of decentralized and centralized risk governance systems for implementation of MRA? As mentioned above, over the last decades, advances in research on multi risk assessment have been remarkable but practitioners on the ground hardly ever have the opportunity to discuss about multi risk issues. Indeed the stakeholders involved, the responsibility allocation of risk and emergency management, the type of decision-making processes, the technical, institutional and financial capacities can vary considerably depending on the degree of centralization. In order to test our hypothesis we start from the analysis of two existing risk governance system, and identify the barriers to the implementations of a multi risk approach. An important point to take into account is the distinction between the present single risk centered governance system and the future possible multi-risk centered governance system. The governance system will transform from the single risk centered to the multi-risk centered only if MRA will be adopted, which is not the case at the moment. For this reason we start our research from an investigation of the strengths and weaknesses of the present single risk centered governance system in respect to how MRA could be implemented. We analyze existing barriers and benefits under current centralized or decentralized governance systems or actually a mixture of them as each of our two case countries shows features of both centralized and decentralized governance systems.

Method

The methodology applied in our work includes a comparative analysis of case studies of the European countries. This analysis allows a comparison of different risk management regimes and, more precisely, top-down and bottom-up interactions in governance. This explains the choice of our case studies: the city of Naples, (Italy), where the institutional landscape is marked by significant autonomy of Italian regions in decision-making processes for assessment of the majority of natural risks (volcanic risk excluded). In case of emergency planning and management instead, Italy is characterised by a mixed top-down, bottom-up organizational system. The other case study is situated in the French West Indies, Guadeloupe, oversee department of France, where the decision-making process is marked by a greater centralization in decision-making associated to a well-established state governance within regions, delegated to the prefect and decentralised services of central ministries. The two case studies were selected as they are both prone to similar multiple hazards. The results presented here are based upon an interdisciplinary research conducted within the EC funded project MATRIX (New Multi-Hazard and Multi-Risk Assessment Methods for Europe), supported by the Seventh Framework Program of the European Commission, whose major aim was to develop new methodologies for multi-risk assessment.

As a part of our research strategy, we apply the case study method, which allows us to investigate the phenomenon of decision-making on a multi-risk mitigation and management in both centralized and decentralized governance systems. The case study method is an intensive analysis of an individual unit, person, community, or event, stressing developmental factors in relation to the environment. Such method is widely applied in a range of disciplines such as psychology, sociology, economics, political science, geography, and medical science. Around a half of the articles in the political science journals apply case study method. In recent decades the method gained its popularity in testing hypotheses. In science, the case study method helped to identify patterns in decision-making process regarding existing risks (Flyvbjerg, Bruzelius, & Rothengatter, 2003). Besides, the method has the value of phenomenological insights, which are gleaned by closely examining contextual expert knowledge (Flyvbjerg, 2011).

Our methodology consisted of four research phases such as institutional and policy analysis, interviews and focus group discussions, workshops and feedback. The institutional and policy analysis included the desk study of legal, regulatory and policy documents for Naples and Guadeloupe to provide a description of the institutional and regulatory framework for risk governance within different natural hazard contexts and to identify comparable sets of governance characteristics across hazards and countries. Then, a series of semi-structured in-depth interviews and a focus group discussion were conducted with a total of 44 participants from Naples and Guadeloupe with three goals: to identify the social and institutional barriers to effective governance in the case of multiple hazards, to propose initial options for overcoming them, and to provide feedback on the results of the governance analysis. This was followed by three workshops with participants from 11 countries (Italy, France, Norway, Germany, Hungary, Bulgaria, Sweden, United Kingdom, Iceland, Croatia, Austria) with the goals, among others, to: i) discuss the barriers and benefits of implementing multi-risk assessment and governance in the test sites of Naples and Guadeloupe; ii) and to receive feedback from a wider audience in order to identify key results that are applicable to other multi-risk environments. Finally, a final round of in-depth interviews was conducted and the questionnaires submitted to workshop participants to collect feedback about the results collected in the previous research phases and to develop recommendations (Scolobig, Vichon, Komendantova, Bengoubou-Valerius, & Patt, 2013).

Natural Risk Governance in the Case Studies

Italy and Naples Case-Study

The risk governance system in Italy is grounded on the administrative structure of the country. Italy is divided into 20 administrative regions, 110 provinces, and 8,104 municipalities (ISTAT, 2012). For risk and emergency management, government services at different levels are structured to coordinate their operations and resources with non-governmental actors through a mixed top-down, bottom-up organizational system, that strategically integrates different capabilities (OECD, 2009). Many municipalities are remote, sparsely populated and possess very limited resources for public services, yet their locations are often highly exposed to natural hazards. For this reason, provinces and regions administrations often have to strongly support them in risk management activities. More specifically, regions play a crucial role, due to a legislative competency in risk management, shared with the state.

It is important to emphasise that there are relevant differences in the authorities in charge of risk management, depending on the hazard and the phase of the disaster risk cycle (broadly speaking risk assessment, warning system, emergency management, recovery and reconstruction). For example, key authorities for risk assessment are at the national level of volcanic risk, at the river basin level of hydro-geological risk, at the national and regional level of seismic risk, and at the regional level of fire risk, although depending on regional specificities.

The case of emergency management is different. The key principle is subsidiarity, i.e., if municipal governance capacities are insufficient to manage the scale of an event, they are supported by provinces and regions as well as central government administration, depending also on the severity of the event (see Table 1).

Moreover three different types of events foresee involvement of different levels of government in emergency management: Type A event can be managed by municipal authorities as part of their routine duties, type B events require coordinated intervention of more authorities at the provincial and regional level, as part of routine duties, and type C events of greater intensity and extent that require coordination and intervention at the

national level (Scolobig et al., 2013).

Table 1

Operative Organization of the Italian Civil Protection System in Case of Emergencies

Type of event			Level	
C			National	Operational committee Major risk commission National Operational room Di. COMA. C (national coordination on site in case of major events)
	B		Regional	Regional operational room Crisis Unit
			Provincial	Rescue coordination centre Inter-municipal operational centres
		A	Municipal	Municipal operational centre (COC) strategy area, decisional function; Operative room

Naples, a city in the Southern Italy with almost one million inhabitants (ISTAT, 2011), is an excellent case to study the complex networks and interaction between authorities in charge of different hazards. Indeed the city is exposed to several natural hazards: volcanic eruptions, earthquakes, floods, landslides, fires and several others. Earthquakes caused by both the Apennine chain tectonic seismic source and the Campi Flegrei and Somma Vesuvio volcanic sources can be felt in Naples. Moreover, landslide phenomena involve both the steep welded volcanic rock slopes of the hills bordering the city. Flood events are very frequent as well, due to the geomorphology of the city, which mainly lies on narrow coastal plains bordered by pyroclastic hills, whose slopes quicken the flow of sediment-laden waters toward the sea (Alberico, Petrosino, & Lirer, 2011). In the last few years, severe forest fires have also been reported in the city of Naples, mainly during the summer period, for example more than 40 forest fires were registered in 2011 (Department of Agricultural, Campania Region, 2012). Mostly, these fires had anthropogenic causes and affected the green areas of the city. Multi risk scenarios that require the action of different authorities can be for example the seismic swarms triggered by volcanic activity, the landslides caused by flash floods, and the fires caused by a volcanic eruption.

France and Guadeloupe Case

In France at the national level, two ministries are dealing with questions of natural hazards, the Ministry of Interior, which is in charge of security issues, and the Ministry of Environment, which is in charge of developing knowledge on risks and developing general prevention tools. The risk mitigation and management questions are within the security area, which includes natural risk knowledge, technological risk and civil security (see Table 2). At the local level, the prefect, higher local representative of the State, together with the state delegated services is responsible for prevention action, often supported by public organisations such as Météo France, BRGM IGPG which are in charge of different risks assessments, and alert monitoring. The prefect is in charge of civil security and is therefore responsible for giving alert, crisis management, and recovery, and can requisite any emergency organisations such as Firemen, ONG, Social services, to do so. The regional and departmental elected collectivities and inter-communalities collaborate on risk prevention for assets within their responsibility, such as schools or public buildings, besides also being responsible for environmental and land use issues. At the level of communes (i.e., municipalities), the major is in charge of civil security within the limits of his commune. This implies information of citizen about known potential risks, prevention and preparation measures and actions in case of emergency. If the mayor cannot assume this function, then the prefect, representative for the State at the departmental level, acts as his subsidiary. The

mayor also reports in his actions to the prefect (see Table 2).

Table 2

Governance Levels for Risks Mitigation and Management

	National	Local state representation	Regional counsel	Departmental counsel	Inter-communalities	Communes
Risk assessment/ prevention	x	x	(X)	(X)	(x)	x
Civil security	x	x				x

Note. Source: BRGM, 2012.

The responsibilities for natural risk assessment are mainly distributed across three different levels, such as central government, local state representation (prefect), and municipalities. Other levels may interfere on voluntary bases (regional and departmental councils), or by delegation of the mayors (inter-communalities). The authorities at these levels are involved into both risk mitigation and management. At the same time, the questions of civil security (alert, emergency, and recovery) are coordinated by departmental state representation or at the central level, if the scale of the event is wider than the department and communes levels.

In France the process of risk mitigation and management shows a bipolarity between the prefect representative of the department of the central government and is directly linked to the relevant ministries (Interior and Environment), the mayor of the municipality is responsible for guaranteeing security to the citizens of his municipality and the prefect can act as subsidiary, if the mayor fails to satisfy his responsibilities. With its 400,000 inhabitants Guadeloupe is exposed to multiple risks such as volcanic, tsunamis, landslides, cyclones and hurricanes. They can also trigger multiple other hazards, by inducing a seawater surge and marine floods and waves which erode the coastal zone, and by heavy rainfalls, which lead to inland flooding and landslides.

Results

The comparison of two case studies allowed us to identify some similarities and differences as well as strengths and weaknesses in the natural risk governance systems in Italy and France that are worthwhile considering for the implementation of an MRG.

In Italy and France, private and public stakeholders from the national to the municipal level interact to guarantee an effective governance system. Several ministries have responsibility for the development of legislation, guidelines, policies, and coordination of other agencies for natural risk management. In Italy, there is a mixed top-down, bottom-up organizational system (OECD, 2009) and the 20 Italian regions also have legislative powers for natural hazard management, as a result of a devolution and decentralization process that started in 1998 (Bassanini Law Decree, 1998; Constitutional Law 3/2001). In France, risk management has a more centralized/top-down nature with a strong role of the state authorities (either central or local representatives, i.e., Prefect and State representation of the Ministries of Environment and Equipment). Regions and department have no regulation competency for risk management.

In Italy, the department of civil protection is a national coordinating body and works together with the competence and functional centres (law decree 3593/2011). These centres are institutions that provide scientific and technical expertise about the nature of hazards and risks, the vulnerability of population and assets, monitoring and real-time predictions and the development of mitigation measures. Another key actor is the civil protection service (established by law 225/1992, last update law 100/2012), an umbrella institution that

guarantees coordination of the disaster management activities. Its main operational organizations are the fire brigades, army, police forces, forestry service, the national health service, and voluntary organizations. Relevant members are also the mayors, the prefects, and the Presidents of the Regional Councils. The guiding principle for emergency management in Italy is subsidiarity. When municipal government capacities are insufficient for managing the scale of an event, they are supported by provinces and regions or the state, depending on what kind of event it is. When a disaster happens, also municipal and/or provincial, regional and national operations centres (MOCs) are activated. Local emergency units work together to define the intervention strategy (Citta' della Scienza, 2008; Regione Campania, 2008) (see Figure 1).

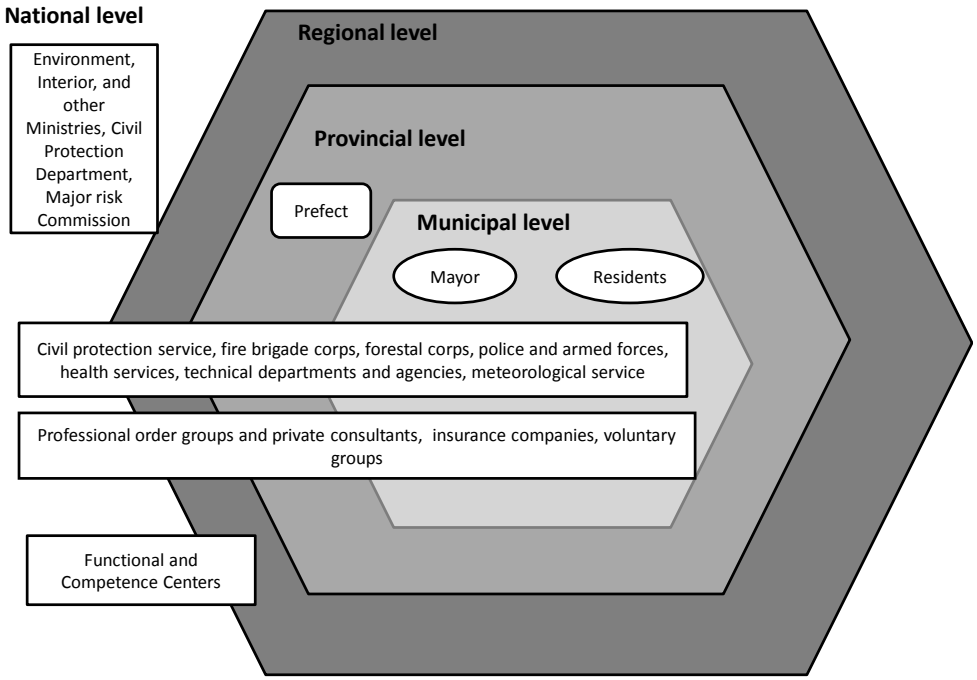

Figure 1. Main stakeholders in Italy

In France, there is a similar emergency organization (law 2004-811 from 13-8-2004). The mayors are the main actors responsible for safety in their respective municipalities. The prefects (State representatives at the department level) are responsible for the local application of policies, they can prescribe implementation plans and are to take over crisis management if a municipality is overwhelmed. Departments and regions can also contribute, mainly by financing equipment or mitigation measures. The risk research and scientific community is made up of several different actors, but they are not organized in networks by law, as is the case of the competence and functional centres in Italy (see Figure 2).

There are also difficulties in communication between private and public stakeholders involved, especially when it relates to interactions between industrial and technological risks. The management of industrial and technological risk is mostly under the responsibilities of private actors. Therefore, assessment of these risks is often not appropriately integrated into planning processes, which are under responsibility of public authorities. Multi-stakeholder participation in decision-making is also complicated by different existing approaches towards hazards assessments, the absence harmonisation of these practices is one of the barriers to multi-risk

governance.

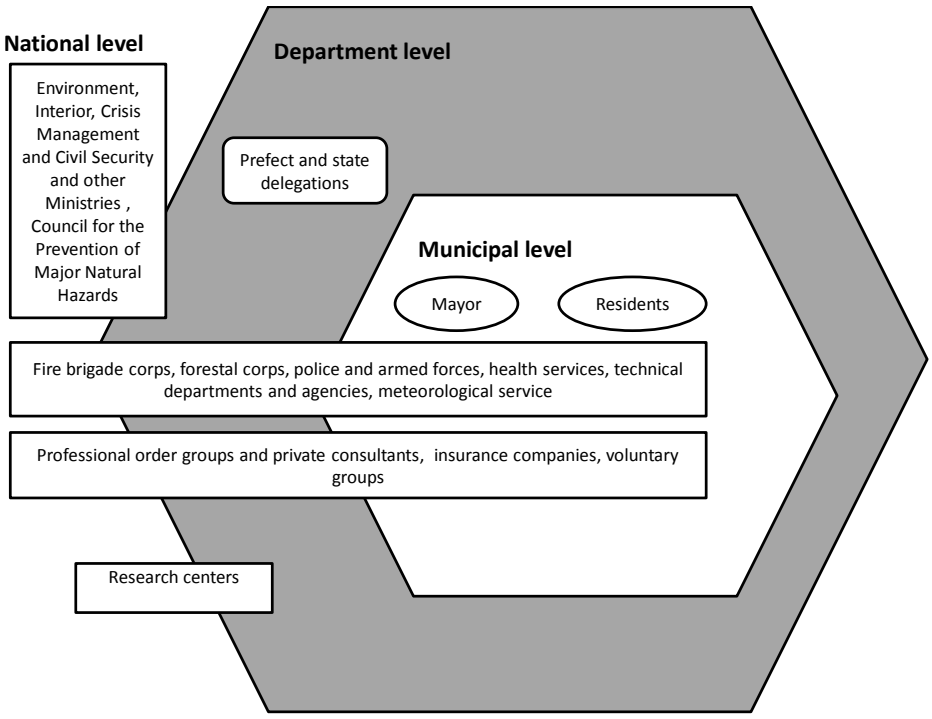

Figure 2. Main stakeholders in France.

Another key difference regards the insurance sector. In Italy, it is not very developed. Indeed, there is no private insurance available for many natural hazards, for example, landslides and floods. For others, like earthquakes and fires, there is only partial coverage. In particular, generally only industrial plants purchase earthquake insurance. This contrasts with the Italian policy of direct intervention by providing post-disaster financial aid and enacting ad hoc laws for recovery. The French system allows a risk transfer to insure and to the state. Compulsory insurance on property and homes includes contribution to a national fund ("fond Barnier", decree 2005-29 from 12-1-2005) which helps indemnify property owners against unexpected and major natural disaster events (CATNAT = catastrophe naturelle), and also supports risk research and risk prevention. Part of the insurance cost is created to help the re-insurance and insurance companies to support the cost of disaster due insured damages, and to fund, in some cases, prevention actions. This system guarantees a low financial risk for individuals in case of disaster occurrence, but leads to a lesser implication of individuals, for their own protection.

The risk assessment is one of the main differences in the two governance systems. In Italy documents for natural hazard prevention, such as hazards or risks or vulnerability maps are only loosely connected with each other. In France the Prefect is in charge of collecting all risk and hazard assessments and then of the development of policy documents and guidelines to address the risks. They deal with the majority of risks and provide recommendations to policy-making process on priority to deal with certain risks in terms of intensity or value of exposed assets. As a consequence, these documents and the risk management plans (PPR) are well connected with each other and with existing management tools.

In France, the risk governance is marked by much stronger centralized governance system and the procedure for risk assessment is divided among state representative services, the local administrative levels and

the scientific organizations. This shared responsibility encourages single risk approaches, related to specific competencies and knowledge of the organizations in charge. The state maintains responsibility over risk prevention management with the help of the prefect and the state decentralized services. It provides guidance for the assessment and prevention procedure. At the municipal level risk prevention might bring conflicts with other competencies: Mayors have competencies on risk prevention as well as on spatial planning and economic development; those objectives may bring the contradictory character to between development objectives and risk prevention. Regional and departmental levels do not have competencies in global risk but are responsible for the security within their property (schools, roads). Their implication is therefore on a voluntary base, depending on the vulnerability to hazards of their patrimony.

The whole variety of existing risks assessments are summarized in the following documents: The departmental document on major risks (DDRM), the synthetic communal document (DCS), is addressed to the mayor, who produces a DICRIM document of information for citizens, as well as PPR are prevention plans for single risks, giving maps the spatial of intensity of hazard exposure; they are open to public consultation In Guadeloupe all communes have a compiled map for all hazards; this is a first step toward a multi-risk approach, and PCS, which are result of a recent law, to prepare the commune and its population in case of the occurrence of a hazardous event. PCS are presently being elaborated. The DDRM is one of the central documents at the departmental level. It covers all risks such as natural, technological, transport, and conflict, which are classified as “major” risks for a given territory.

These documents have, however, also deficiencies. For instance, DDRM deals with all “major” risks but do not have an MRA (i.e., the recommendation of concrete roof for hurricanes, danger during an earthquake). PPR are not real multi-risk assessments but are a compilation of single risks. The process of consultation about the municipal documents (PPR, PCS, and DICRIM) is not very wide and needs to be improved, besides the developed documents are not developed in not an “easy ready format”.

What types of risks are “major” which is decided in terms of the importance of human, economic and environmental assets exposed and in terms of frequency and intensity. Each risk is described by its processes, typology and driving forces. DDRM also includes a simplified hazard map and summarizes all policies for a given risk and provides advices on behavior of population before, during and after the event. It also indicates all agencies involved and the level of their responsibility. The DCS represents a declination of the DDRM. It lists all known risks within the town territory. DDRM is usually produced by the prefect or his representatives in charge for equipment, environment, health, security, and communication. It is based on the risk assessment and information from experts and scientists as well as stakeholders from private and public agencies. DCS is written by the prefect’s security services and addresses the mayor.

At the departmental scale, the prefect (state representative) is coordinating all efforts. The guidelines developed under the coordination of the prefect help to inform decision-making at different levels regarding prevention and emergency actions. Following the demand of the mayor, the prefect can also prescribe the elaboration of the risk prevention plans, usually developed for single risks at town scale. When approved, these prevention documents are legally impossible to former documents and are therefore included in urban development plans and municipal mapping. These documents usually lead to protective measures, recommendations and identification of development constraints such as insurances limitations, development under regulations etc.. Based on the DCS, the mayor informs the population about the known risks through the information communal document about major risks (DICRIM). It provides information on the known risks as

well as existing and planned measures for prevention, protection, and emergency. In terms of hazard and risk assessment France has much stronger coordination of different efforts and incentives. Several institutions are involved into assessment of single separate risks. From this knowledge, the ministry in charge of environment develops guidelines, which are based on risk assessments conducted by different institutions. These guidelines serve as a basis for the development of documentation at the departmental level.

One of the barriers to the adoption of a multi-risk approach in Italy is the difficult interaction between different authorities dealing with different types of risks and hazards. Cooperation is particularly difficult for risks that are managed by authorities acting at different governmental levels. For example, in Naples, national bodies are responsible for volcanic risk, river basin authorities for flood risk, and regional authorities for seismic risk.

The efforts for the prevention of different natural hazards in Italy result from maps, procedural studies, reports, and programs, which are produced by different agencies and at different geographical scale. These documents are only loosely connected to each other. For example, there is no unique strategy connecting geological reports on river basin plans to seismic requirements. The urban plans at regional, provincial and municipal level should collect the key information from the authorities in charge in order to effectively implement building constraints, but interviewees report that this does not always happen. The methodological approaches to elaborate the maps are also completely different. The seismic risk assessment is based on maps and study of vulnerability of single households, while the hydro-geological risk assessment is grounded on hazard and risk maps as well as on event modelling and simulations. The risk and hazard assessment of hydro geological risks is characterized by much lower level of uncertainty in comparison with volcanic and seismic risks: Modelling is helped by more data provided by high frequency/low intensity of hydro-geological events compared to high intensity /low frequency seismic or volcanic events. Another example is regarding forecast of earthquakes, which is not possible, and floods, which is possible when an efficient monitoring system is in place.

The emergency plans are also under the responsibility of different authorities. In Naples, the plans for volcanic emergency management are prepared by the National Civil Protection. At the same time, hydro geological plans are under the responsibility of the municipal and provincial authorities. Recently a new law (law 100/2012) was enacted where emergency plans became compulsory and all Italian municipalities had to finalize and approve them by 14 October, 2012. However efforts are still for local authorities to implement a unique strategy, which would connect information from different hazards.

The distribution of resources for assessment and mitigation of risks in Italy is unequal. In recent past, the hydro geological events were more frequent than seismic or volcanic events. Therefore, more resources were distributed to hydro geological risks than to seismic or volcanic ones, in both mitigation and recovery and reconstruction phases. The institutional frameworks and division of powers between national and regional levels in Italy for different types of risks and hazards are also unequal. In case of the hydro geological risks the whole risk assessment system is highly decentralized and the river basin authorities play a key role in connecting the national and municipal agencies. Volcanic and seismic risks are characterized by high level of centralization, which does not support interagency communication.

Interagency cooperation and communication are particularly difficult for risks that are managed by authorities acting at different levels. For example, in Naples, the plan for volcanic emergency management has been prepared by the National Civil Protection, while hydro-geological emergency plans are under the responsibility of municipal authorities. There is also the lack of communication between emergency units and

land use planners.

Conclusion

Both governance systems have their own strengths. Elements of centralized multi risk governance system could lead to improvement of interagency communication and creation of an inter-agency environment, where the different departments at the national level, can exchange information, identify the communities that are most exposed to multiple risks and set priorities, and provide consistent information and responses on multi-risk to the relevant stakeholders at the local level. A decentralised multi risk governance system can instead favour the creation of local multi-risk commissions to discuss and take action on multi-risk issues with an interdisciplinary and multi-sector character. These commissions can include experts with experience in multi-risk assessment and backgrounds in meteorological, geological, and technological risks, local risk emergency managers and practitioners, and local natural hazard advisors, acting as the liaising bodies between local communities and practitioners. Local risk commissions can provide suggestions for the elaboration of risk maps and urban planning that take into account multi risk scenarios, encourage the development of local capacities, and develop educational and training activities.

Both governance systems suffer from common deficiencies, the most important one is a frequent lack of capacities at the local level, especially financial but sometimes also technical and institutional ones. Of course there are exceptions and some communities have necessary resources to manage risks. As also past experience and research shows (UNISDR, 2005; 2013), the responsibilities for disaster risk management are often transferred from national to the local level without sufficient resources for implementation of programs on risk management. The difficulty in balancing available resources between short and medium-term priorities often complicates the issue. In both cases the lack of human resources, time for implementation of programs and the transfer of competences and experience between governance levels sets the limit for an efficient risk management.

Further research is needed in order to test how MRA can be efficiently implemented in both types, centralized vs. decentralized, governance systems. Our recommendations are that the implementation of MRA can be facilitated through encouragement of knowledge exchange and dialogue between different disciplinary communities, such as geological and meteorological to better forecast worst case scenario and to make bridges between natural and social sciences also. This can be supported by development of territorial databases and platforms for knowledge exchange to collect and share information about multiple hazards.

In terms of action and communication the implementation of MRA can be strengthened through creation multi-risk platforms under coordination of local authorities, which help practitioners to take action, to understand and communicate the key multi-risk contexts to their communities, to emphasise different components of risk, and to be attractive to private and public users. This can be supported by the establishment of local multi-risk commissions, which will act as local natural hazard advisors and will liaise between local communities and risk management experts. They can carry the responsibilities of monitoring, prevention, mitigation, and implementation of MRA. These commissions can unify affords of numerous actions involved into natural hazard management.

However, it is necessary to bear in mind, that MRA cannot be subsidiary to a single risk approach and that both approaches have to be pursued. Before the MRA can be effectively implemented, there is a need to finalize the single risk assessment processes, which are currently on-going in Europe and those maturities are quite different in terms of vulnerability and hazard assessment. Following this, MRA requires harmonization of

methodologies, terminologies, and databases first.

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