

## **Ph.D Research Proposal: Environmental Policy and Management**

**Title: Assessing Community Resilience in Mediterranean Region**  
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### ***Introduction***

Human populations are concentrated along coasts, and consequently coastal ecosystems are some of the most impacted and altered worldwide. These areas are also sensitive to many hazards and risks<sup>i</sup>. Leaving aside droughts, floods are the most dangerous meteorological hazards affecting the Mediterranean countries, followed by windstorms and hail. This is due not only to high flooding frequency, but also to the vulnerability created by various human activities<sup>ii</sup>. Climate change acts also as a trend-breaker as well as creating a larger variability in the occurrence of extreme flood events. This result in increasing degrees of uncertainty towards which traditional probability based flood management policies might not provide adequate responses. Furthermore, ongoing processes of urbanization (both expansion and densification) increase susceptibilities of asset concentrations to floods, thus increasing overall vulnerabilities of urban areas to an increasing degree<sup>iii</sup>. In this regard, flood disaster is considered as a major natural hazard due to its devastating effects on the affected area<sup>iv</sup>. Floods are the costliest natural hazard in the world and account for 31 per cent of economic losses resulting from natural catastrophes<sup>v</sup>. Especially the effects of a flash<sup>vi</sup> flood are potentially dramatic and can be measured both in terms of lost human lives and property damages totaling millions or even billions of Euro. In its 2000 policy statement, the American Meteorological Society<sup>vii</sup> acknowledges flash floods as one of nature's worst killers. Many recent examples globally as well as in Europe and in the Mediterranean basin support this claim. Despite many efforts to protect against floods, it has proven impossible to eradicate them completely. In order to develop new, and more efficient approaches, recent years have seen signs of a shift from an approach based upon flood prevention via structural approaches and the provision of large-scale flood defenses to an emphasis on resilience and adaptation<sup>viii,ix,x,xi,xii</sup>. In particular, recent research literature amply shows that inter- and trans-disciplinary approaches are needed in order to develop new conceptual frameworks not only for generating and collecting knowledge about the risks, but also about making decisions on how to mitigate, control, and manage it<sup>xiii,xiv,xv</sup>).

**The main goal of this project is to gain knowledge, about people's awareness, preparedness and social support systems regarding flooding emergencies or disasters in flood prone cities of Mediterranean basin. To this end background information on natural risk multi-level governance in the Euro-Mediterranean area will be gained, and combined with the measurement of baseline indicators of communities' resilience from flood prone Mediterranean cities. The developed conceptual framework will be tested in selected areas of Italy (e.g. Venice, and the Po plain). The results can then feed into the development of civic ecology education intervention programs designed to enhance preparedness and resilience in the region through interpretation processes.**

**The ultimate scope of this project is to produce a generic risk resilience model that can:**

- **guide the development of community capacity (resilience) to adapt to and develop from exposure to flood hazard consequences in Mediterranean Coastal Cities.**
- **assist the formulation of practical intervention strategies,**
- **facilitate the development of planning initiatives by supporting resource allocation strategies (e.g., to direct resources to areas/groups within the community according to need), and**
- **provide an empirically validated set of key performance indicators for the assessment, monitoring and evaluation of resilience at different levels of analysis (e.g., district, regional) and for different demographic groups.**

This proposal describes the process of model development and testing in flood hazard resilience. The steps needed for the model development includes intervention strategies, planning initiatives and assessment methodologies by engaging civil ecology education programs through interpretation processes.

### ***Risk governance***

Writing from a research perspective Renn<sup>xvi</sup> argues that risk governance is a wide-ranging and multidisciplinary activity that "*requires consideration of the legal, institutional, social and economic contexts in which risk is evaluated, and involvement of the actors and stakeholders who represent them. Risk*

*governance look at the complex web of actors, rules, conventions, processes and mechanisms concerned with how relevant risk information is collected, analysed, and communicated, and how management decisions are taken*". Our societies are experiencing a turn from government to governance, i.e. an increased role of non-State actors in steering them. Furthermore, new challenges are emerging in dealing with natural risks, closely linked with the acknowledgement of the limitations of science and of the uncertainties associated with the use of predictive models. This is the reason why the idea of risk governance has been proposed over the last years, even if it has been dominated by the discourse on technological hazards, such as those posed by nuclear power or GM crops. By contrast, more natural hazards, such as floods, are poorly covered by the risk governance literature.

### ***Risk Resilience***

The Oxford English Dictionary defines resilience as (i) the act of rebounding or springing back and (ii) elasticity. The origin of the word is in Latin, where *resilio* means to jump back. In a purely mechanical sense, the resilience of a material is the quality of being able to store strain energy and deflect elastically under a load without breaking or being deformed<sup>xxvii</sup>. However, since the 1970s the concept has also been used in a more metaphorical sense to describe systems that undergo stress and have the ability to recover and return to their original state. Resilience is seen as a desirable property of natural and human systems, including cities and coastal zones, in the face of a range of potential stresses, including climate change-related hazards<sup>xxviii</sup>. In this proposed project by resilience, we mean the capacity of linked social-ecological systems to absorb recurrent disturbances such as floods so as to retain essential structures, processes, and feedbacks<sup>xix,xx</sup>. Resilience reflects the degree to which a complex adaptive system is capable of self organization (versus lack of organization or organization forced by external factors) and the degree to which the system can build capacity for learning and adaptation<sup>xxi,xxii</sup>). Under extreme circumstances of flood hazards, resilience is a function of the capacity of community members and societal institutions to respond in ways that allow them to confront and adapt to the demands they encounter using their own resources and competencies. The concept of resilience is a profound shift in traditional perspectives, which attempt to control changes in systems that are assumed to be stable, to a more realistic viewpoint aimed at sustaining and enhancing the capacity of social ecological systems to adapt to uncertainty and surprise.

### ***Civic Ecology Education through Interpretation Procedures***

Civic ecology refers to the philosophy and science of civic ecology education and other volunteer-driven restoration practices in cities and elsewhere. Such practices, although often viewed as initiatives to improve a degraded environment, also foster social attributes of resilient social-ecological systems, including volunteer engagement and social connectedness<sup>xxiii</sup>. Civic ecology education refers to the learning, as well as the social and ecosystem outcomes, that occur when young people and other novices engage alongside experienced adults in civic ecology practice<sup>xxiv</sup>. Interpretation as a mission based communication process that forges emotional and intellectual connections between the interests of the audience and the meaning inherent of the resource<sup>xxv</sup> could significantly facilitate civic ecology practice that encourage social resilience. Fostering resilience in social-ecological systems can be viewed as a process of building the adaptive capacity of multiple individuals in that system<sup>xxvi</sup> as well as a process of contributing to a set of social and ecological attributes of resilient systems<sup>xxvii</sup>. Civic Ecology Education contributes to a subset of these attributes, with a particular focus on social learning, multiple forms of governance, and resource management practices that are adaptive to feedbacks from the system being managed, involve collaboration among multiple stakeholders, and incorporate multiple types of knowledge, biological and social memories, and biological and cultural diversity. Environmental learning through interpretation procedures is situated in management practices embodying resilience attributes (e.g., diversity of biological and cultural resources, governance, and knowledge systems). These procedures may contribute to civic ecology education both *indirectly* to enhancing environmental sustainability and resilience through changing attitudes and knowledge, and *directly* through focusing the learning around stewardship practices. Civic Ecology Education should not be viewed as an isolated means to address environmental issues but rather as a complex and multifaceted part of a larger system of interacting structures and processes<sup>xxviii</sup> such as interpretation. Engaging interpreters to work along with civic ecologists as they transform neglected and degraded sites into positive assets for local communities and the environment could create a resilient thinking audience. In particular, such partnerships encourage the audience and especially young people to integrate scientific ways of thinking, an appreciation for nature, and learning from people from all walks of life and cultures, and thus become stronger individuals

and more able to contribute to the resilience of our communities. Towards this end the successful application of resilience to civil ecology education initially requires being explicit about how interpretation of resilience is used<sup>xxxix</sup>.

### ***Project Concept***

In order to develop new frameworks and approaches to better manage natural risks from a community perspective, it is very important to understand all actors, institutions, strategies, and policies that characterize the risk governance system. For natural hazards the relationships between levels of governance have also become increasingly important. This can be seen for example in the international scale joint frameworks and cooperation strategies such as the EU-Mediterranean Disaster Information System ([www.eu-medin.org](http://www.eu-medin.org)). The Hyogo framework (2005-2015)<sup>xxx</sup> identifies ‘good governance and ‘international and regional cooperation’ as particularly important to support actions at the local levels. The EU has become more directly involved in the governance of natural hazards, and new ways of working between local, regional and national actors have been described. Those at risk, householders, businesses, farmers, infrastructure managers, are becoming managers of the risk and part of the multi-scale risk governance framework. Research has shown that a number of community, individual and institutional attributes can be used as indicators of preparedness and resilience<sup>xxxi</sup>. These indicators include outcome expectancy, action coping, articulation of problems, community participation, empowerment, trust and self-efficacy. By working to develop these characteristics within a community, we can influence the way our communities prepare for, respond to and recover from natural disasters such as flash floods. It is possible to measure the indicators shown below, and link this information to assess how prepared and resilient a community is. This project will therefore analyze the risk governance structure of the Euro-Mediterranean region in order to identify the role of the different agents and institutions in shaping its actual operational functioning. This will be important to understand how the specificities of different risks, as well as the social, cultural, institutional and political contexts influence the successful or unsuccessful implementation of pre-defined risk management schemes. To date, we have measured these indicators by undertaking surveys. From analysis of the surveys, we can determine the most critical resilience factors (indicators) for each community, i.e. which of the personal, community and institutional factors are most strongly affecting resilience in that community. Measurements of the indicators can be taken to get a baseline set of data about a community’s current resilience at flood prone Mediterranean cities and an understanding of where intervention strategies should be focused. Once the intervention strategies have been employed, it is then desirable to measure again these indicators, at a later stage in order to check whether resilience has increased. By doing ongoing measurements, the intervention strategies can be assessed for their effectiveness and adjusted if necessary.

### **Research methodology**

#### ***Civil protection Agencies Views on Flood Risk Governance***

In order to gather information about risk governance in Mediterranean countries we propose the usage of an in-depth literature review about flood risk governance in EU-Mediterranean countries. In addition, using Q-Methodology<sup>xxxii</sup>, we will study the beliefs and priorities views of Civil protection agency staff of EU Mediterranean Countries (i.e Italy;Greece;Spain;France;Cyprus;Slovenia;Malta) regarding flood risk management and preparedness measures.

#### ***Community Survey***

Based on the conclusions of Civil Protection Agency staff we propose the usage of a general survey designed to collect data from households about resilience and preparedness Selected Mediterranean Cities<sup>xxxiii</sup> (e.g. Venice and Po Plain). Therefore, a suitable questionnaire will be developed based on the above indicators in order to collect quantitative data specifically on community resilience indicators and tangible measures of preparedness. **Development of the questionnaire will be undertaken based on the views of with the civil protection agencies representatives of Mediterranean EU countries.** The findings from a survey on flood preparedness and resilience will still be generally applicable for other hazards. The survey will collect quantitative baseline data which could serve as evaluating tools for the effectiveness of future education campaigns and engagement strategies.

#### ***Method of delivery***

A random sample of addresses will be obtained and the questionnaires will be mailed to households located at properties in selected communities. Where this is not possible, questionnaires will hand-delivered to a random selection of properties. To increase response rate, two weeks after the delivery of the questionnaire a reminder letter and replacement questionnaire will be sent to those households who have not returned the questionnaire, again inviting them to participate.

**Analysis**

On receipt of the questionnaires, the data will be coded, entered and analyzed using the Statistical Package for the Social Sciences (SPSS) program. Following that, a process with interviews will follow. The content analysis of the transcripts will be made using the Nvivo discourse analysis package.

**Qualitative Interviews**

To date, there has been very little in depth study on how individual, community and societal factors interact. Therefore we have limited information on determining how people perceive hazards, and on how effective preparedness actions are. In order to gain a detailed understanding on how and why people become more resilient at an individual level, we propose to undertake a series of interviews with community members living in selected vulnerable Mediterranean Cities. The interviews will provide specific details on how to enhance resilience and they will contribute to the development and evaluation of intervention strategies. Approximately, 20 interviews will be undertaken with people living in every selected vulnerable cities. Interviews will be unstructured, allowing participants to freely talk about their status of preparedness. Data collected will be analyzed using the indicated method for qualitative analysis. The outcomes will be compared to the data gathered from quantitative analysis (data from questionnaires) as well as from q-methodology analysis. Focus groups will also be conducted in the survey areas where interviews are not conducted (e.g. rural communities) to collect qualitative information about preparedness processes in those areas. **Ethics approval will be obtained through before survey, interviews are arranged and conducted.**

**Timeliness and relevance of the project.**

The costs for the proposed project covers the first two years (baseline) survey, interview data collection, analysis and reporting (to December 2012). However we have outlined a longer program of measuring resilience to show where intervention programs and subsequent resilience measurements may fit within a wider timeline.

**First resilience measurement cycle:**

Target Dates	Period	Time
Q-sort Statements Construction	Jan - Feb 2011	2 months
Civil Protection Agency Staff Interviews	March- April 2011	2 months
Interview (Q-Methodology data analysis)	May- June 2011	2 months
Questionnaire development	Jul- Aug 2011	2 months
Questionnaires delivered	Sep - Dec 2011	4 months
Questionnaire data analysis	Jan-April 2012	4 months
Rural Community Interviews	Sep-Dec 2012	4 months
Interview Data Analysis	May – June 2012	2 months
Draft report	Jul - Oct 2012	2 months
Final reporting	Nov-Dec 2012	2 months

**Development and delivery of intervention / education programs: Early 2013**

**Second resilience measurement (future potential research):**

Re-interviews	late 2013	2 months
Interview data analysis	late 2013	1 month
Questionnaires delivered	early 2014	3 months
Questionnaire data analysis	2014-2015	2 months
Reporting (draft and final report)	2014-2015	4 months

## Refinement and continued improved delivery of intervention / civic ecology education programs.

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- <sup>xxxii</sup> Raadgever et al 2008 research based on Q methodology proved to be an effective tool for measuring perspectives on a flood management case study, allowing for structured elicitation of individual perspectives, and identification of shared perspectives and groups of respondents that share these perspectives.
- <sup>xxxiii</sup> **Case Studies:** Although floods affect the entire Mediterranean region, their frequency and impact is not homogeneous over the entire area. Their greater frequency and social impact in the north-western part, together with major preventive measures (emergency plans, environmental law, participation in international projects and so on), contrasts with the scant information on floods available in some southern and eastern countries (Llasat et al 2010). In particular, for the period 1990–2006 the material damage in EU Mediterranean countries exceeded 29,136 million with Italy being the country with the greatest losses followed by France, Romania, Turkey and Spain (Llasat et al 2010). Thus, for this project we will choose to study two flood prone cities of Italy as case studies. In particular case studies will be conducted in selected communities at vulnerable at flash floods cities of Venice and Po Plain.