

Editorial

Risk Mitigation, Vulnerability Management, and Resilience under Disasters

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The present Special Issue is devoted to vulnerability management and resilience-building as cornerstones of disaster risk mitigation.

For decades, experts and management authorities have worked strenuously for disaster risk mitigation at all levels, from global to local, but the results of the respective efforts have been poor. Disasters and disaster losses continue to increase in number, along with the affected populations, the extent of the affected areas, and the loss value [1]. Over the last 20 years, more than 7000 natural disaster events have been recorded worldwide, claiming around 1.23 million lives, affecting more than 4 billion people, and causing economic losses of approximately USD 2.97 trillion [2]. In addition, it has become more difficult for the most vulnerable victims to recover after disasters. Part of the explanation for this inconsistency between efforts and results may be due to the increase in the number and intensity of extreme meteorological and climatic events associated with CC. However, most of the reasons for the inconsistency are found in the lack of ability or willingness of all those involved in disaster risk mitigation to proactively achieve vulnerability reduction and/or resilience-building using strategies and measures, which probably imply sacrifices in development gains. The present Special Issue deals with the factors underlying this incompetence and ways to redress it.

Poor attention to vulnerability reduction and missing policies for resilience-building are due to several reasons. One reason comes from the over-confidence and emphasis put by managers on environmental engineering works as the most effective means to counteract hazards [3]. This option disregards not only the unpredictability of certain hazards and the elusive sense of safety created by technical works but also the decisive role of spatial (and other forms of) development in several aspects of exposure and vulnerability (human, social, economic, institutional, cultural, territorial, etc.). Indeed several losses and their persistence are due to pre-existing exposure and vulnerability, with territorial and institutional vulnerability being the most neglected, despite their primary importance.

A second reason for the lack of vulnerability reduction and missing policies is risk-blind development plans. Development has been associated with positive economic expectations, income increases, and improved habitation opportunities [4]. Therefore, spontaneous spatial development and statutory planning follow social aspirations that may even be hazardous to develop privileged but sensitive and/or hazardous environments (e.g., coastal zones, riverbanks, peri-urban forest land, etc.). These dynamics result in extensive landscapes at risk of flood, forest fire, and other disasters and a widespread culture opposing vulnerability/exposure reduction and risk prevention as a constraint to economic and other development, reducing land-use values [3]. An instructive example of how risk-scapes proliferate and expand is the case of mixed forest-housing areas exposed and vulnerable to forest fires in the Mediterranean Region.

Both vulnerability management and resilience-building presuppose preventive and preparedness responses to disasters (although resilience is mostly apparent in the relief and recovery phase). However, prioritizing and implementing such proactive measures is only possible in the case of a widespread culture of preparation for adversity and contingencies. Especially in affluent societies, this is rarely the case, and the political leadership usually



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puts attention and financial support on positive prospects of potential development gains, not on the avoidance of losses [4]. This missing culture of anticipatory preparation for adversity is the third reason for the lack of attention to vulnerability and resilience.

The fourth reason for the lack of preparedness comes from the difficulties in building and practicing community and personal resilience as a result of the lack of or unequal distribution of the necessary resilience capital [5], i.e., physical (e.g., dwellings, public infrastructure facilities), social (e.g., networks, reciprocity, trust, social relations), political and institutional (e.g., normative framework, competences, organizational capacity), and financial capital (e.g., savings, income, subsidies, funding).

Finally, activation of both the public and private sector for vulnerability management and resilience-building necessitates sufficient knowledge on the part of the respective actors: what are the major local hazards? Who is vulnerable to these hazards, and why? What changes, by what means, might reduce vulnerability and potential disaster losses? Which actors are the most effective and efficient to introduce these changes, at what level? What are the most appropriate resources (resilience capital) to engage in resilience-building, and how can the vulnerable actors secure accessibility to these resources? The lack of knowledge on the above issues or partiality of knowledge by the actors at risk, including experts and management authorities, is an additional explanation of the lack of attention to vulnerability reduction and the missing policies for resilience-building.

The basic objective of the Special Issue is to pave ways to DRR through vulnerability reduction and resilience-building (from the level of a household and a social group to the international level) versus a wide range of disaster risks.

The first contribution by Gavriil Xanthopoulos, Miltiadis Athanasiou, Alexia Niki-foraki, Konstantinos Kaoukis, Georgios Mantakas, Panagiotis Xanthopoulos, Charalampos Papoutsakis, Aikaterini Christopoulou, Stavros Sofronas, Miltos Gletsos, and Vassiliki Varela focuses on forest fires in mixed forest residential areas on the island of Kythira, Greece, to elevate prevention and preparedness policies and actions targeting vulnerability and enhancing resilience. The authors criticized the obsession of the Greek state with the fire-suppression component/stage of the forest fire risk management cycle by referring to the metaphor “the fire-fighting trap” as a quick fix (rather than a long-term management strategy), inducing negative, unintended consequences. The authors proposed a road map of successive actions to upgrade the prevention and preparedness levels of the forest-fire-prone island. These include: (a) the construction of a forest fuels map to serve as a forest fire hazard information tool; (b) vulnerability assessment of a sample of building structures in settlements exposed to potential fires; (c) systematic information of the locals to alter their perceptions on risk and their housing vulnerability and to motivate them toward preparing their homes for a potential event. The authors emphasized voluntary action and community participation in decision making for proactive measures and their implementation. The authors acknowledged that several countries, including Greece, lag behind in voluntarism and community involvement in forest fire risk prevention and preparedness efforts. However, they argued that this abstention from knowledge and action by the community members at risk should change, predominantly the ignorance of their vulnerability and their capability to mitigate it. To that end, the authors proposed personalized risk-assessment information dissemination, i.e., a risk assessment for each property. They also proposed motivation by example as effective means for raising awareness and recruiting volunteers for preventive and preparedness action. Finally, the authors emphasized that the risk-communication strategies should be tailored to the at-risk communities’ skills, habits, norms, beliefs, and risk culture.

While the first article focuses on efforts to persuade communities to turn their interest and financial requirements towards preventive and preparedness measures for vulnerability reduction—instead of only expecting state emergency action at times of difficulty—the second contribution of this Special Issue focuses on the obstacles to building resilience at the local level. Gerard Hutter, Alfred Olfert, Marco Neubert, and Regine Ortlepp considered tensions at the interface of science and practice as a major obstacle to operationalizing

resilience. They started their research note assuming that building resilience is a complex social change generated by motors (e.g., teleological, dialectic, etc.). Considering this social change through the lens of Strategic Spatial Planning, they found tensions that were associated with (a) diverging mindsets towards planned social change (originating from different institutional structures, etc.), (b) trade-offs implied by the multiplicity of hazards bedeviling a community and the variety of community agents' interests, and (c) the complexity involved in knowledge integration (due to the diversity of knowledge contents, frames, and approaches). The authors tested their assumptions about tensions between science and practice in resilience-building with a specific project example, "the Heat Resilient City" (HRC), which dealt with summer heat stress and proposed three ways out of the deadlocks: developing a strategic focus, setting priorities, and negotiating a compromise.

An especially enlightening component of the article is the analysis of the risk knowledge issue: the inconsistencies between knowledge from science and practice, compartmentalization of knowledge among citizens, business organizations, public institutions, and scientific experts, as well as other difficulties involved in risk knowledge integration. Under these circumstances, the reliability of the views and advice of experts was challenged, and the authors suggest that risk knowledge integration in pre-disaster terms should be considered not only as a technical exercise with objective results but as a "highly political and contested endeavor", too.

The closely related issue of objective versus subjective characterization of specific social groups as vulnerable, at risk, risky, etc. under pandemic conditions, is discussed by Katarina Giritli Nygren, Maja Klinga, Anna Olofsson, and Susanna Öhman in the third contribution to elevate the social construction of such characterizations and implications for the elderly care system. The authors focus on the early stages of the COVID-19 pandemic and examine the related articles and reports in three Swedish newspapers published during 2020. The social group of concern is the elderly, and the methodology on which the study is based is corpus-assisted discourse studies (CADS), which is actually a combination of corpus linguistics and discourse historical analysis. The basic objective was to explore the discursive formations of the elderly versus the risk of the pandemic in the Swedish media. The authors wondered, "to what extent are the elderly (as an entity) really at risk and vulnerable?" They attempted to find whether the epistemic conditions of health vulnerability and risk to life for the elderly were amplified/emphasized or attenuated in the corpus. Their findings (referring to the mass media) confirmed other findings from similar studies carried out elsewhere. The elderly were considered as a homogenous group, and the collocating words used were fragile, vulnerable, ill, exposed to infection, not full-fledged members of the society, and lacking the ability to act. On the other hand, the authors remarked that reference by the media to "our elderly" as a risk group that should be protected is a form of political inclusion prioritizing and safeguarding the native elderly, over or instead of other vulnerable groups such as immigrants.

The fourth contribution by Efthymios Karymbalis, Maria Andreou, Dimitros -Vasileios Batzakis, Konstantinos Tsanakas, and Sotirios Karalis deals with the hazard and exposure components of risk in the case of flood in the catchment of Megalo Rema, East Attica, Greece. The authors' attention was on the scientific dimensions of risk, and the most important result of their work was the demarcation and mapping of flood hazard zones as a necessary background for local level risk assessment and risk-sensitive land-use planning. Their methodology was Multi-criteria Decision Analysis combined with GIS. The factors/parameters considered and taken into account as the most influential were slope, elevation, distance from stream channels, geological formation, and land cover. Particularly, land cover is a variable affected by human interventions, evidencing the dependency of flood hazards and exposure on the human factor. The authors pointed to the highly and very highly exposed-to flooding areas (44% of the total catchment) as relatively low-lying, gently sloping, and extensively urbanized, and which host the densely populated settlements in the catchment of Megalo Rema. The authors adhered to their

methodology as an effective tool for flood-risk-informed land use and spatial planning and as a necessary background for flood risk-management strategies and action plans. Indeed, flood-hazard and exposure maps are an essential part of (objective) risk information, a valuable tool for determining the areas and infrastructure for which studies of territorial and technical vulnerability should follow, and a basic awareness tool to back public and private pre-disaster responses to flood risk.

The fifth contribution by Funda Atun and Chiara Fonio returns to issues of disaster risk awareness, risk perception and culture, and resilience practices built on subjective risk. This time, the social group of concern was Turkish migrants living in Northern Italy, their preparedness level, risk awareness, and their (probably resilient) behavioral patterns during emergencies. The methodology employed by the authors included a face-to-face questionnaire with 544 individual respondents and focus groups meetings with various socio-cultural groups. The methods were applied at three different urban scales: regional, community, and household. The questionnaire gathered information on the Turkish community's socio-demographic features, their disaster experience, preparedness, awareness, and their potential behavior during an emergency. On the other hand, the purpose of the meetings was to gain in-depth knowledge on the awareness, needs, feelings, beliefs, behavioral patterns in an emergency, and priorities. The most crucial query to the participants (about their risk perception) was, "what is a disaster for you?" Most of the respondents did not refer to a specific hazard as a disaster but rather to human-induced adversities such as migration and islamophobia. Floods and earthquakes were considered by the participants as the most probable risks, but there was a widespread lack of interest among the migrants in preparedness actions. Coping with linguistic and other cultural barriers was a key factor for the improvement of their preparedness.

Of the other findings of the work, one may pick out the fact that the social network is the main resource of Turkish migrants in case of emergency, especially for those who do not speak the local—Italian—language. However, while a strong sense of community provides migrants with some resilience resources, isolation from the domestic culture and social networks may be a barrier to resilience-building. In any case, and despite barriers, there is a high resilience potential among migrants due to their daily struggle to cope with existing inequalities. A major component of the migrants' resilience is their freedom to move in the case of a disaster.

Anna Fokaefs and Kalliopi Sapountzaki move forward to the next phase of the disaster management cycle, i.e., the emergency phase (the sixth contribution), to investigate the role of emergency information—released to the public and management authorities—in seismic crisis management. The authors discuss the uncertainty of seismic crises and, consequently, emergency seismic information. What are the differences between the models of seismic crisis communication adopted in earthquake-prone countries, how do these models handle uncertainty, and what are their effects on public perceptions, public and private emergency responses, and ultimately, on disaster management? To offer convincing answers, the authors presented and compared the seismic crisis communication models and strategies of Greece and Japan. First, they presented the two systems in terms of the sources, means, content, and mode of emergency information communication; then, they addressed and analyzed the successes and failures of each system during operation. This second analysis was based on actual experiences of seismic crisis management in the two countries.

The work confirmed that the major challenge of the seismic crisis period is how to handle uncertainty from multiple origins: a lack of knowledge and data, especially in the first post-event minutes; inherent variability present in the seismic phenomenon; ambiguity due to different knowledge frames of experts and public perceptions; technological gaps and failures; and coordination and governance barriers. The work evidenced that the highly centralized emergency communication systems have both merits and weaknesses. Among the latter is the fact that they allow only limited feedback from local-level empirical data. The recommendations for emergency communicators and managers—in the final

section of the paper—on how to reduce or handle uncertainty represent a significant part of the added value of the article.

The issue of “objective” risk information to feed development and spatial planning returns with the seventh contribution by Adriana Galderisi and Giada Limongi. The theme in focus was not the hazard and exposure but the exposure and vulnerability components of risk within a multi-hazard context. The authors opted for an indicator-based method to carry out a comprehensive analysis of exposure and vulnerability in urban areas prone to multiple hazards. The work acknowledged the multiple facets of vulnerability (physical, social, systemic) that are critical for spatial planning and built sets of spatialized data and information that can be combined into different output maps, from maps showing the vulnerability features of selected elements (e.g., housing units) to comprehensive maps showing the overall levels of exposure and vulnerability. The authors used the Phlegraean Fields, a large volcanic area located in the western part of the metropolitan city of Naples, Southern Italy, as a testing case study area. The area represents a multi-hazard urban environment of high exposure because, on top of the volcanic hazard, it is prone to other natural and manmade hazards (earthquakes, landslides, industrial hazards, etc.), and it features high population density and very important historical, archaeological, and natural heritage. Application of the methodology resulted in a series of thematic maps illustrating “hotspots” in terms of exposure and several aspects of vulnerability to single and multiple hazards.

The basic value of the article rests with the determination of the spatial dimensions of several aspects of vulnerability and exposure to single and multiple hazards, their translation into sets of indicators, as well as their selective integration and mapping with the help of the GIS tool. The ultimate aim was to feed spatial planning with risk knowledge, thus building so-called risk-informed or risk-sensitive spatial planning. However, as the authors admit, the methodology does not capture interactions among hazards, causing secondary hazards and new interactions with vulnerability resulting in catastrophic impacts and tertiary hazards, etc. As already mentioned, epistemic risk knowledge carries uncertainty and limitations.

Maria Kousis and Katrin Uba discuss the changes in environmental concern and activism during hard times, which, more often than not, are periods of increasing livelihood vulnerability. With their (eighth contribution), the authors oppose the argument that hard economic times are obstacles to environmental activism. To this end, the authors compare Environmental with non-Environmental Alternative Action Organizations (AAOs) using a cross-national dataset of 4157 hubs-retrieved AAOs active during the economic crisis in France, Greece, Germany, Italy, Poland, Spain, Sweden, Switzerland, and the UK. Using empirical data from a comparative European Commission project shed light on environmental activism engaged in participatory solidarity initiatives reflecting a transformative capacity (economic, environmental, socio-political) for resilience, mostly at the local level. The authors concluded that environmental protection and sustainable development were not neglected during economic hardship. Difficult times provide opportunities for EAAO activism to broaden its scope of action by focusing on alternative practices and lifestyles, simultaneously benefiting basic social needs, livelihoods, and the environment. The authors suggested that the findings of their study could be useful for any “hard times” occasion, not only that of an economic crisis but also public health and climate crisis or cases of natural or manmade disasters. The new focus of EAAOs on direct solidarity action seems to be promising in the long-term to build collective resilience to cope with or manage post-disaster crises, climate crises, etc. Compared to non-Environmental, the EAAOs tend to be informal and focused on contention and protests mobilized by the intensity of the 21st-century challenges and their catastrophic potential.

The ninth contribution revisits the issues of risk perception and awareness in an insular, multi-hazard context: the Azores island facing both telluric (volcanic) and climate-related hazards. The key research questions that the authors Ante Ivčević, Isabel Estrela Rego, Rui Gaspar, and Vania Statzu attempted to answer were: how does the local population

perceive the threat of the natural hazards present in Azores? What is the relationship between local risk awareness and risk-mitigation strategies? The authors conducted a web-based survey with a relevant questionnaire administered to a sample of Azoreans. The basic conclusion was that although risk awareness alone is not enough for measures to be implemented, it may be an important initial motivation for locals to accept and support the implementation of mitigation measures.

Altogether, 201 individuals responded to the questionnaire, with their ages ranging from 18 to 45 years. On average, respondents considered earthquakes and Climate Change as the most likely extreme natural phenomena to occur in their area. The least expected phenomena were wildfires, droughts, and tsunamis, while the occurrence of volcanic eruptions and heatwaves was mostly perceived as unknown. The most important secondary question raised out of the participants' responses was how to reduce the gap between having hazard knowledge and using this knowledge to implement precautionary measures. The authors suggest that this gap may be related *"to the locals' low perceived control and self-efficacy as they are somewhat unable to overcome the structural and psychological barriers to mitigation strategies implementation"*. An interrelated research query is much the locals are willing to pay to protect their house against risks (e.g., Climate Change risks) by using precise methods such as contingent valuation exercises. The above assumptions and questions, raised for both telluric and climate-related hazards, open a very important window for research to follow.

The last (tenth) contribution written by Stefan Greiving, Leonie Schödl, Karl-Heinz Gaudry, Iris Katherine Quintana Miralles, Benjamín Prado Larraín, Mark Fleischhauer, Myriam Margoth Jácome Guerra, and Jonathan Tobar deals with countries and territories jeopardized by multiple hazards and dynamic vulnerability processes, hence high-disaster-risk levels. The main concern of the authors was to find paths towards coordinated and integrated action originating from spatial planning and emergency management to improve the performance of countries such as Chile and Ecuador in policy goals coming from UN-ISDR and UN SDGs. The authors argued that while both countries have shown considerable progress in the implementation of the UN strategies, multi-risks, however, are rarely considered, and there is still increasing vulnerability due to the expansion of informal settlements. To compare the two Latin-American countries (sharing a similar risk profile as they are part of the Pacific Ring of Fire), the authors put special attention on their largest Metropolitan Regions, Quito and Santiago de Chile, due to their hazard profile, high vulnerability as economic powerhouses of their countries, and the relatively high-risk management capacities. The guiding research questions were: what are the root causes of vulnerability and risk in Chile and Ecuador? How do these two countries perform in regard to the Sendai Framework global targets E (existence of adequate national and local DRR strategies) and G (availability of and people's access to multi-hazard early warning systems and disaster risk information)? The authors (a) conducted a desk-top analysis of national policy documents and strategies as well as local risk-management and land-use plans for Quito and Santiago de Chile, (b) collected primary data for in-depth evaluation of context-specific assessment and management strategies during a field trip, organized two workshops in Ecuador with central and local level public officials, and (c) conducted expert interviews with stakeholders from various agencies to validate empirical findings.

Based on their analysis, the authors arrived at a serious criticism of the global monitoring system destined to achieve UN-ISDR strategies. According to their words, *"the global monitoring is primarily designed as enforcement control (input indicators) combined with a control of target achievements (output indicators), but lacks a real control of the effectiveness of the existing disaster risk management system... this cannot be done based on purely quantitative variables. There is a need of local knowledge gathered from document analyses, surveys and interviews"*. Indeed, how can the current global monitoring system of indicators capture problems of the institutional language/terminology such as those identifying risk with threat; or problems related to the lack of active involvement and empowerment of citizens in identifying risk

areas and evacuation routes? In addition to the indicators, there is a need for quality criteria to be addressed by the national reporting requirements.

As a general message from the Special Issue, the reader should keep in mind that both epistemic risk information/knowledge (objective risk) dissemination and risk perception (subjective risk) understanding are key factors to vulnerability management and resilience-building by public and private entities at all spatial scales and in every stage of the risk-management cycle. A lack of risk information accessible to all concerned and the absence of an understanding of risk-perception limitations by managers hampers (anticipatory) vulnerability management [6] and resilience-building.

List of Contributions

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3. Giritli Nygren, K.; Klinga, M.; Olofsson, A.; Öhman, S. The Language of Risk and Vulnerability in Covering the COVID-19 Pandemic in Swedish Mass Media in 2020: Implications for the Sustainable Management of Elderly Care.
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5. Atun, F.; Fonio, C. Disaster Risk Awareness: The Turkish Migrants Living in Northern Italy.
6. Fokaefs, A.; Sapountzaki, K. Crisis Communication after Earthquakes in Greece and Japan: Effects on Seismic Disaster Management.
7. Galderisi, A.; Limongi, G. A Comprehensive Assessment of Exposure and Vulnerabilities in Multi-Hazard Urban Environments: A Key Tool for Risk-Informed Planning Strategies.
8. Kousis, M.; Uba, K. (Non)Environmental Alternative Action Organizations under the Impacts of the Global Financial Crisis: A Comparative European Perspective.
9. Ivčević, A.; Rego, I.E.; Gaspar, R.; Statzu, V. Telluric and Climate-Related Risk Awareness, and Risk Mitigation Strategies in the Azores Archipelago: First Steps for Building Societal Resilience.
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