



Editorial

Introduction to the Special Issue “Socio-Natural Disasters and Vulnerability Reduction in the territorial ecosystems”

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The awareness of the existence of natural hazards, the study of their characteristics and the most appropriate behaviour to adopt against them are a realistic way of manage them and reducing their negative effects on the population, cultural and artistic heritage, and social and economic activity of a given area.

Human communities live in territorial ecosystems where extreme natural events such as landslides, earthquakes, tsunamis, floods, hurricanes, volcanic eruptions, droughts could occur [1]. These events become “disasters” when they involve a population, causing widespread human, material, economic or environmental losses. Both population and unsustainable economic growth have caused population expansion in high-risk areas, increasing vulnerability. In fact, people’s vulnerability cannot be attributed only to an increase of the occurrence of extreme physical phenomena. Vulnerabilities are shaped by social, economic and political conditions. Even if considerable progress has been made for understanding causes and processes related to the mentioned natural phenomena and their probability of occurrence, further efforts need to be made for Disaster Risk Reduction (DRR)—i.e. to reduce the damages caused by natural hazards with the complicity of the society. In fact, despite the still very frequent diffusion of the expression “natural

disaster”, disasters cannot be defined simply natural but, more correctly, “socio-natural” [2], being processes—slow or sudden—that are located in the intersection between “nature and society”, resulting from the interaction between a destructive agent (such as an earthquake, a tsunami, a hurricane, a flood) and the socio-cultural and environmental context on which it impacts [3].

The study of risk perception is part of non-structural risk mitigation interventions that consist of actions aimed at harm reduction through the introduction of constraints that prevent or limit urban expansion in areas at risk, emergency planning, implementation of warning systems and monitoring networks [4]. Downs has distinguished three different aspects in the perception of the environment: the structural, preferential and evaluative. Within this third aspect, risk perception is an important dimension for planning [5]. In this context, according to Alexander [6], risk perception also plays a key role in determining vulnerability. The latter, according to the definition published by the Italian Department of Civil Protection [4], widely used in the scientific world, refers to the degree of loss of a given element or set of elements resulting from the occurrence of a phenomenon of a given intensity, expressed in a scale from zero (no damage) to one (total destruction). According to Alexander [6,7], this concept is too simplistic; in fact, following the thought of the scholar, vulnerability is given by the function $V = Ra - Rm \pm Rp$ in which:

- Ra is the amplification of risk, or the consequence of bad planning and negligence in the application of the rules for the construction in the areas at risk;
- Rm is the risk mitigation, due to proper planning and security measures in the construction;
- Rp is the perception of risk, which is usually conditioned by the culture prevailing in the area at risk.

Mitigation measures should therefore not only be based on an understanding of natural processes, but should also take into account cultural, environmental, social and economic factors—indispensable factors to guide effective actions to reduce disaster risks. The disaster can be defined as a rapid, instantaneous or profound impact of the natural environment on the socio-economic system, when the latter lacks the capacity to reflect, absorb or repel the impact [8]. On this basis, national governments and local authorities should promote the central role of communities in risk management, including preparedness, adaptation and mitigation. This is particularly desirable in inland areas where restricted access may delay national disaster response efforts.

Furthermore, consultation with local communities is also crucial for spatial planning through a bottom-up rather than top-down approach. The use of public knowledge in scientific and technical risk assessments can, in fact, strengthen community resilience, help communities to make decisions based on their own knowledge and, when combined with scientific data, correct their erroneous perceptions of potential risks. This will help communities translate risk perceptions into greater preparedness for earthquakes and other natural hazards. Therefore, public participation can be understood not only as a process that democratically assigns values to the costs and benefits of different risk management strategies, but also as a way to enable policy makers to understand whether there are areas where the population requires more information or have preferences different from those of local policy makers [9]. As highlighted by Chowdhury and Haque [10], scientists and politicians often agree that the public has a tendency to react emotionally or subjectively to complexity and is often unable to appreciate the uncertain and complex nature of environmental issues. The public, on the other hand, tends, many times, to criticize experts (scientists and policy-makers) for using an inaccessible technical language and for not having provided clear and

complete answers. These problems highlight the gap between the public and experts and the need to improve the understanding of risk perception between the public and experts.

In this reference framework, this Special Issue focuses on the following aspects:

- raising people’s awareness of risk, change and uncertainty in their lives;
- passing on historical memory together with a knowledge of diversity in a multiscale, multidisciplinary (geo-ecological, social, cultural and political) sense in order to increase the options available and minimize risk [11]. Furthermore, the analysis of the population’s perception of natural phenomena and possible successive intervention with regard to behaviour that is considered improper and unsuitable in the context of risk, can provide a stimulus for the adoption of positive individual and social behaviour for risk reduction;
- cohabiting adequately with natural hazards;
- reducing vulnerability of people and property, and the exposure to hazards;
- improving preparedness and early warning for adverse events, communication and emergency planning, recovery and rehabilitation initiatives.

Therefore, the Special Issue underlines the importance of activating a series of Disaster Risk Reduction actions and strategies (policies) that involves, at different scales, every part of the society, the government, the professional and private sectors and members of the academic community. This Special Issue aims to present case-study based analysis of interdisciplinary approaches, also innovative, to Disaster Risk Reduction (DRR) and Disaster Risk Management (DRM). Ana Hampshire and James L. Sipes’s work focused on the potential outcomes of an increased use of green infrastructure in comparable urban areas, and its effects on flooding volume. These measures would likely improve the performance of existing urban drainage systems and attenuate flood incidence in the area, also promoting connectivity between areas otherwise detached or only accessible by car, improving walkability and incentivizing engagement in outdoor activities. Maria Laura Longo’s paper deals with a case study about the evacuation of Rione Terra, in Pozzuoli, during the 1969–1972 unrest of the Campi Flegrei volcano in southern Italy, analyzing “how the memory of this traumatic event influences the behaviour of a population facing risks in the present”. Francesca Romana Lugerì, Piero Farabollini, and Nicola Lugerì’s work focuses on the role and importance of the landscape which encompasses a lot of meanings and trigger emotions and provides us with the most effective disaster risk reduction tools to educate to Earth Sciences, “especially those ones that can help individual/community/society to better behave, toward a healthier planet and a shared well-being”. The work of Margherita Bufalini, Piero Farabollini, Emy Fuffa, Marco Materazzi, Gilberto Pambianchi, Michele Tromboni highlights the comparison of different hydrological models, generated using HEC-HMS software on three sample basins of the Adriatic side of central Italy. The research shows that “the use of shorter and recent rainfall series results in a generally higher runoff, mostly in case of events with a return time equal or higher than 100 years”. The focus of the work of Elisabetta Dall’Ò, based on place-names, is to prove how social vulnerability of Aosta Valley, a francophone region in the North Western Alps of Italy, is rooted into the landscapes, in its history, and in its memoryscapes. According to the author, “historicizing vulnerability signifies to renegotiate the collective memory and the socio-spatial identities, by allowing the dialogue between past and future”. Giovanni Gugg deals with various social elaborations of risk, through the ethnographic approach, basing his contribution on the case of volcanic risk in Vesuvius, Naples, southern Italy. The author underlines how “there are associations and communities that do not ignore the risk, nor have a fatalistic attitude, but are active to rebuild a more equitable and sustainable relationship

between humans and the ecosystem”. Leonardo Mercatanti and Gaetano Sabato’s work aims to analyze the risk perception by the inhabitants of some villages that rise around the Etna volcano, Catania, southern Italy. The authors compare the ways in which recent earthquakes were perceived by some residents in the area and the ways in which some online newspaper narrated the events, “trying to understand, from a geographical and cultural perspective, how the perception of the risk can be narrated attributing different values to hazard”. The work of Giovanni Messina aims to retrace, through a critic study of the scientific debate, the Belice Valley’s territorial context after the 1968 violent earthquake and to identify the actual development perspectives of the area, using official dataset and consolidated bibliography. Finally, Simone Valitutto wrote a review of the book “Disasters in Popular Cultures” (Geographies of the Anthropocene book series, Il Sileno Edizioni, Rende, Italy, 2019, 253 pages, edited by Giovanni Gugg, Elisabetta Dall’Ò and Domenica Borriello) describing it as “a work of critical, multidisciplinary and multisituated reflection that allows the reader to understand the methods and techniques of popular narration of natural and man-made disasters”.

Thus, the volume, using an interdisciplinary approach, highlights that the implementation of non-structural risk mitigation interventions is essential to prevent an extreme natural event from turning into a disaster and to reduce the vulnerability of territorial ecosystems. Such interventions have the need and the usefulness of being used within an integrated, adaptive and inclusive approach that can connect the aspects related to planning, programming, study, analysis and design with those equally important regarding risk perception and communication, social and economic capital, psychological, cultural and institutional aspects.

Conflicts of interest

All authors declare no conflicts of interest in this paper.

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