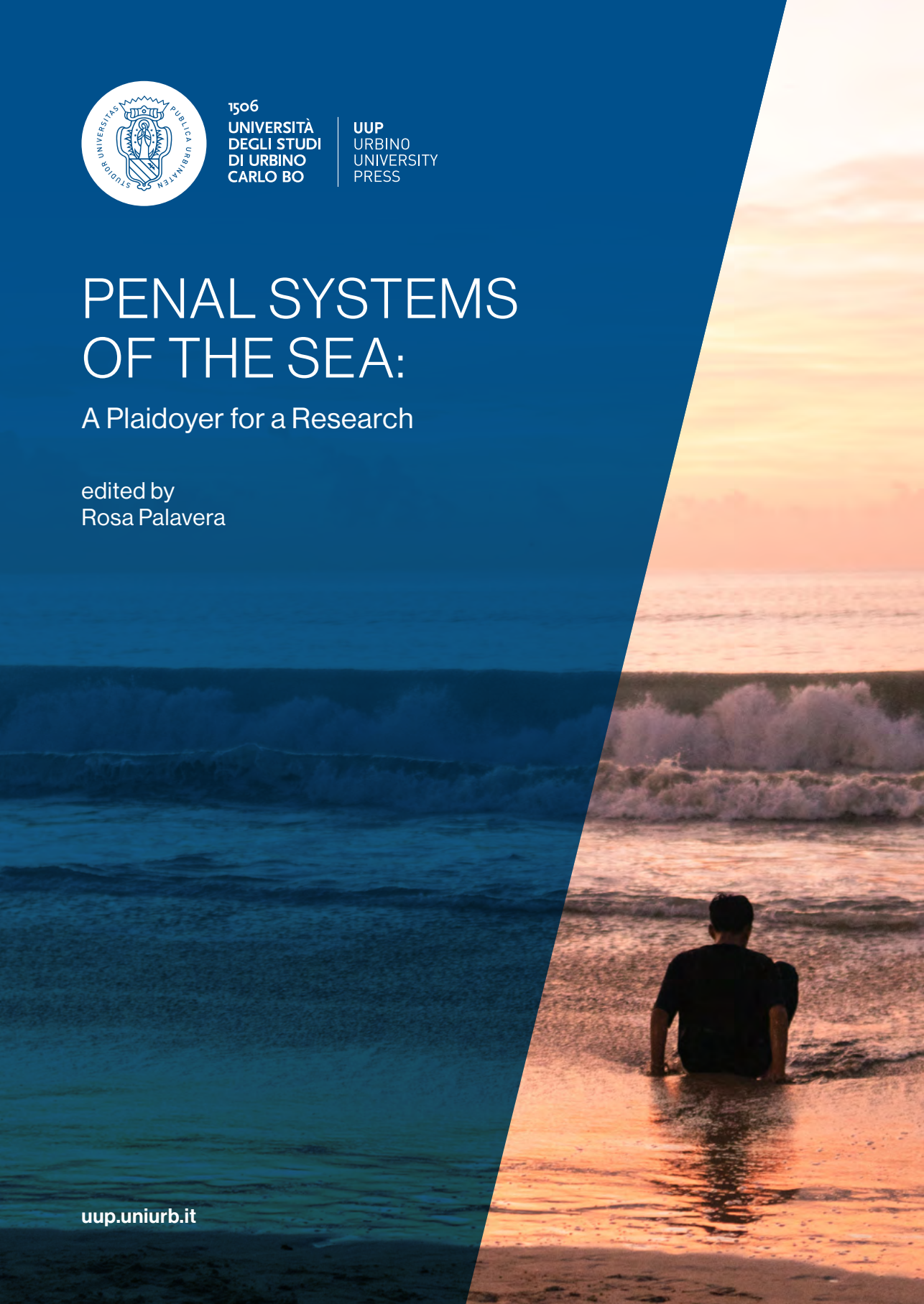
1506
UNIVERSITÀ DEGLI STUDI DI URBINO CARLO BO

UUP
URBINO UNIVERSITY PRESS

PENAL SYSTEMS OF THE SEA:

A Plaidoyer for a Research

edited by
Rosa Palavera



uup.uniurb.it

IEP
INCONTRI
E PERCORSI
N.06

INCONTRI E PERCORSI è un collana multidisciplinare che nasce nel 2022 e raccoglie le pubblicazioni di convegni e mostre promossi e organizzati dall'Università di Urbino.

Volumi pubblicati

01.
Le carte di Federico. Documenti pubblici e segreti per la vita del Duca d'Urbino (mostra documentaria, Urbino, Biblioteca di san Girolamo, 26 ottobre - 15 dicembre 2022), a cura di Tommaso di Carpegna Falconieri, Marcella Peruzzi, UUP 2022

02.
Paolo Conte. Transiti letterari nella poesia per musica, contributi di studio a cura di Manuela Furnari, Ilaria Tufano, Marcello Verdenelli, UUP 2023

03.
Il sacro e la città, a cura di Andrea Aguti, Damiano Bondi, UUP 2024

04.
Diritto penale tra teoria e prassi, a cura di Alessandro Bondi, Gabriele Marra, Rosa Palavera, UUP 2024

05.
Federico da Montefeltro nel Terzo Millennio, a cura di Tommaso di Carpegna Falconieri, Antonio Corsaro, Grazia Maria Fachechi, UUP 2024

1506
UNIVERSITÀ DEGLI STUDI DI URBINO CARLO BO
UUP URBINO UNIVERSITY PRESS

PENAL SYSTEMS OF THE SEA:

A Plaidoyer for a Research

edited by
Rosa Palavera

PENAL SYSTEMS OF THE SEA: A PLAIDOYER FOR A RESEARCH
edited by Rosa Palavera

Studies and notes following the meeting Penal Systems of the Sea: "Liquid Law" or Hard Case?, Università degli Studi di Urbino Carlo Bo, Urbino, Italy, May 24th, 2024.

This volume was published with the financial support of the Università degli Studi di Urbino Carlo Bo as part of its programs to promote and disseminate scientific research.

Progetto grafico / Graphic design
Mattia Gabellini

Referente UUP / UUP contact person
Giovanna Bruscolini

On cover: photo by Mattia Gabellini

PRINT ISBN 9788831205573
PDF ISBN 9788831205559
EPUB ISBN 9788831205566

Le edizioni digitali online sono pubblicate in Open Access su: https://uup.uniurb.it

Via Aurelio Saffi, 2 | 61029 Urbino
https://uup.uniurb.it/ | e-mail: uup@uniurb.it

L'edizione cartacea del volume può essere ordinata in tutte le librerie fisiche e online ed è distribuita da StreetLib (https://www.streetlib.com/it/)

SOMMARIO

IMPROVING PEOPLE'S SELF-PROTECTION BEHAVIOUR TO ENHANCE COMMUNITY RESILIENCE TO TSUNAMI RISK

Lorenzo Cugliari
Istituto Nazionale di Geofisica e Vulcanologia

«Festina Lente»
Tranquillus, G.S. (1954). *De vita duodecim caesarum libri XII*

PREFACE

Festina Lente is a Latin locution that I have had imprinted on me since high school. It articulates, and fulfils, two essential connotations of risk communic(action)[1], especially in the context of relationship between institutional policymaking and its translation into citizens' behavior (sometimes not). In Italy, this relationship, is often characterised by two-speed procedures: '*festinant*' rapid, hurried (sometimes contorted) from an institutional point of view in contrast to the capacity for comprehension, decoding and consequent individual and community action or reaction, which are mostly '*lentē*'.

In this chapter I will refer – using examples from my field experience in recent years with the National Institute of Geophysics and Volcanology – to those situations in which more immediate, synthetic, and decodifiable information from the weakest links in the chain, less '*lentē*', would 'be sufficient' to generate more effective responses to phenomena such as tsunamis and coastal risks. At the basis of rational human (individual and community) action, it is essential to increase knowledge and improve awareness of territorial risks by clearly indicating appropriate rules and behaviour to be used preventively – and if necessary – in relation to the context.

1 In this specific case, I decided to split the word communication to better represent the two concepts associated with two different meanings, as explained later.

1. INTRODUCTION

Tsunami risk management constitutes a considerable challenge for those in Italy – and not only, as we will see later – who are involved, at various levels, in the mitigation chain (before) and event response (during/after) in relation to events that are hazardous to people's safety (see e.g. Valbonesi et al., 2019; Amato, 2020; Selva et al., 2021).

Institutions (national, regional, and local), as well as research bodies and competence centres, are working to design or re-adapt risk mitig (action) strategies that make interventions on the territory more applicative and concrete, through more shared, effective, and efficient communication. In this way, different public bodies will be provided with tools to implement, if necessary, collective, and autonomous behavioural responses appropriate to the situation and which are in any case protective (Margheriti et al., 2021; Rafliana et al, 2022; Massa & Comunello, 2024).

The mitigation process would thus be completed (Kasperson & Pijawka, 1985; Tsuchiya & Shuto, 1995; Wang & Weng, 2020; Oetjen et al., 2022). 'Mitig(action)' is a term that embraces two fundamental concepts originating from Latin of a desirable unified process: *mītĭgāre*, i.e. to reduce, a management-related task performed by the institutions in charge, actually carried out in multiscale risk reduction policies; *ăgĕre*, as a behavioural reaction that all individuals, institutions and bodies in charge, once they have decoded and internalised the information provided by regulations, will consciously implement (Messer, 2003; Miranda & Kim, 2006; Bulkeley et al., 2011). The path can be summarised in three phases: Assessment, Preparation and Hazard Response (Parsons et al., 2016; McEntire, 2021). This process necessarily requires a continuous and multi-directional exchange between the 'upstream' component of the system (those who assess and mitigate risk) and the 'downstream' component of the system (those who act) (Sakalasuriya et al., 2018; Haigh et al., 2019).

In this chapter I will focus on the relationship between the two components which, interpreted in a '*festina lente*' key, invites the actors involved in a risk mitigation process to find a balance between i) the rapidity of production of a regulatory and procedural apparatus oriented to fast and urgent rationalisation, and ii) the need for understanding, accuracy and reflexivity at the basis of success of a visible/implementing mitigation process which, in my opinion, is struggling to be accomplished in Italy. This process was theorised by Gerald Roland who proposed a similar categorisation of insti-

tutions in 2004 (Roland, 2004). Roland identifies two types of Istitutions: the 'slow-moving' institutions such as culture which includes values, beliefs and social norms that require gradual change and people assimilation, and the 'fast-moving' institutions such as political institutions that may not necessarily change often but can change quickly without the need for readaptation of the 'slow-moving' institutions. From this theorisation emerges the need to incorporate institutional norms into cultural norms.

The result of this balanced and thoughtful process would lead, even if slowly, to an increase in the resilience of communities exposed to various coastal hazards. Finally, the assimilation of management rules, use, good practices (Das, 2023) and – above all – knowledge and awareness of the risks linked to the coastal context in which one lives, stimulates citizens to use self-protection behaviour from which they and the upstream component benefit (Main & Hammond, 2008; Dominey-Howes & Goff, 2013). The process is long and not immediate, and the lack of specific investments and young resources engaged in the process is a further scourge to which proper attention is not paid.

2. THEORETICAL CONTEXTUALIZATION

2.1. THE SENDAI FRAMEWORK FOR DISASTER RISK REDUCTION 2015-2030

The discourse cannot be shaped omitting an overview of the advances made to date at the international level in the field of Disaster Risk Reduction (DRR), the frame within which we are moving. Following the Hyogo Framework for Action (HFA) (UNISDR, 2005) in 2015, during the third World Conference on Disaster Risk Reduction, the United Nations launched the Sendai Framework for Disaster Risk Reduction 2015-2030 (SFDRR) (UNDRR, 2015). This key document establishes a cohesive set of action lines to counteract the impacts of natural events that, depending on the context and exposure, can primarily harm individuals and, secondarily, human infrastructure.
The primary action objectives for the four macro-areas of the SFDRR are:

1. Understanding disaster risk.
2. Strengthening disaster risk governance to manage disaster risk.

3. Investing in disaster risk reduction for resilience.
4. Enhancing disaster preparedness for effective response, and to 'Build Back Better' in recovery, rehabilitation, and reconstruction.

For the purposes of this chapter and my personal study expertise, I will focus on macro-areas 3 and 4 of the SFDRR. Macro-area 3 urges governments to invest funds and energy into increasing community resilience in disaster risk reduction. This is particularly desirable when individuals within a community achieve widespread A) knowledge of their living environment and contextual risks, B) awareness of the regulatory norms in place, and C) understanding of their reactions in emergencies – thus promoting greater autonomy in managing themselves and their community, which also considers their surroundings – in the event of a hazardous occurrence. Furthermore, it is hoped that there will be an understanding that, in the medium and long term, terrestrial environments are subject to variability, with implications for different ecosystems, particularly marine ecosystems (Pearson & Pelling, 2015).

Macro-area 4 refines the discourse on individual autonomous accountability within various roles, emphasising and reinforcing what was introduced earlier in point C. The focus is on enhancing community preparedness to face disasters by considering every aspect: scientific, technical and operative, social, and communal.

Macro-area 4 is based on the theory of Build Back Better (BBB) (Fernandez & Ahmed, 2006). BBB gained international relevance within the context of disaster management, environmental crises, and post-disaster reconstruction policies following the disastrous tsunami of 2004 in the Indian Ocean – an event that prompted global disaster risk reduction systems to rethink population protection strategies and implement new globally interconnected early warning systems. The strategy proposed in BBB has since been adopted by various organisations, including the United Nations, and applied in different global contexts. Based on the idea that after a crisis, the focus should not just be on rebuilding to pre-existing conditions, but rather on rebuilding in a more sustainable, resilient and equal way, with a focus on the existing and future social context.

From a social intervention perspective, the reconstruction plan acknowledges that a community's resilience is determined not only by its physical infrastructure but also by its social texture and network. A key point in this regard is to enhance the capacity of individuals to resist and

cope with future crises through self-protection actions and mechanisms. This can be achieved through i) continuous training and support – for residents and among residents – to assume an active role in risk management; ii) improved and increased management of local resources by residents, enabling them, in times of crisis, to activate mechanisms for mutual support in collaboration with the relevant authorities during the reconstruction process (Magis, 2010; Castleden et al., 2011; Berkes & Ross, 2012).

I realise that the resilience summarised in point 4 embraces a holistic view that puts social factors first and then the environmental, economic and production spheres on the same level. This approach represents an optimal improvement in intracommunity relationships – both vertical (Institution/Citizen) and horizontal (Institution/Institution – Citizen/Citizen) – (see i.e. Lotfi & Larmour, 2022) to better address future challenges arising from climate change, which are becoming evident much sooner than anticipated a few years ago (such as rising sea levels, coastal erosion, storm surges, and increasing marine temperatures), as well as unpredictable geological phenomena that generate tsunamis (such as major earthquakes, coastal or underwater landslides, volcanic eruptions or collapses).

In conclusion, integrating the application of the SFDRR principles and the Build Back Better strategy to promote community resilience to disasters is essential (Kennedy et al., 2008). Future-focused strategies that engage individuals and communities at every level of risk management and disaster response are crucial to address the challenges posed by a changing environment (Khan et al, 2023; Mitra & Shaw, 2023).

2.2. A WEBERIAN INTERPRETATION OF THE SFDRR

An analysis of macro-area 4 of the Sendai Framework for Disaster Risk Reduction (SFDRR) from the perspective of Max Weber's theory (Weber, 1958, 1978) allows us to understand the complexity of the social and cultural dynamics that influence disaster risk management. Weber, through his distinction between different types of social action, offers a useful interpretive lens for understanding how human action is conditioned by rational, ethical, cultural and affective factors, which are essential for interpreting the behaviour of institutions and communities towards risk (Weber, 1978).

One of the central aspects of Weberian considerations is the concept of instrumental rationality, which refers to action oriented towards achieving specific goals in the most efficient way possible. In this context, mitiga-

tion action with respect to purpose, emphasised in the SFDRR, is reflected in risk reduction policies that are based on scientific data, risk analysis and long-term planning. Weber describes this action approach as the most typical type of modern rationality, where every measure taken is aimed at achieving a goal: the reduction of vulnerabilities and the protection of human lives. Governments, international organisations and communities, from this perspective, are encouraged to develop rational, coordinated and disaster-prevention-oriented strategies.

Along with instrumental rationality, Weber identifies a second type of social action: the value-rational social action. In the context of SFDRR, risk mitigation action can be guided by moral and ethical values, such as the duty to protect human lives and the safety of communities. This perspective is evident in policies that, even if economically onerous or politically challenging to implement, are adopted to respect principles such as human dignity, solidarity and social justice. Here, the effectiveness of action is measured not only in terms of concrete goals, but also in respect for shared ethical values that reflect a collective responsibility for the well-being of people and the environment.

Weber also emphasises the role of habits and traditions in human actions, identifying a type of social action named 'traditional social action'. In this sense, context-specific mitigation action emerges when decisions are influenced by established cultural practices. For example, the reconstruction of infrastructure in vulnerable areas, despite risk awareness, can be interpreted as behaviour influenced by deep-rooted cultural habits. The decisions based on local traditions, rather than on a rational risk analysis, show how instrumental rationality can coexist with value-rational social action and established practices, which have their own importance in modern societies. The Sendai Framework attempts to balance the need for a rational, planned response to disasters with recognition of emotional reactions that inevitably arise in crisis situations. In Weber's theory there is a place for the existence and persistence of affective action, driven by emotion rather than logical reasoning. This type of action is relevant in the immediate aftermath of a disaster when the responses of communities and authorities can be strongly influenced by emotions. The importance of involving local communities, listening to their concerns and integrating their knowledge into decision-making reflects this awareness. Understanding local realities, risk perceptions and collective emotions thus becomes an essential element in improving the effectiveness of risk reduction policies.

The Weberian interpretation of macro area 4 of the SFDRR also leads us to consider the increasing rationalisation of modern societies in their attempt to manage risks. Weber observed how modern societies increasingly tend towards rationality, especially in their organisational and bureaucratic forms. Here, institutions must operate according to rational logic, developing early warning systems, emergency plans and long-term strategies to reduce the risk of disasters. However, Weber also emphasises that the legitimacy of political action is not only based on technical efficiency, but also on the ability to involve and mobilise communities. Citizens' understanding (*Verstehen*) of policies[2], as well as their active involvement in risk reduction strategies, becomes a key element for the legitimacy of political action.

In other words, effective risk management requires not only rationality and organisation, but also recognising the affective, cultural and moral dimensions that influence human action. The Sendai Framework, while emphasising the need for scientific and rational approaches, understands the importance of integrating social dynamics and considering the involvement of local communities as a key element in the success of risk reduction policies.

2.3. CITIZENS'BEHAVIOUR AS A FUNCTION OF THE INSTITUTIONS' PERCEPTION. SOME INSIGHTS FROM TYLER'S POINT OF VIEW AND THE SOCIOLOGY OF LAW.

Through Tyler's lens and the sociology of law, in this section I deal with the perception of normative legitimacy and the resulting self-protective (or not) behavioural responses of citizens in response to a disaster occurring, in our case caused by a tsunami. Tyler, a legal sociologist, developed an important theory on the relationship between citizens and the law, particularly regarding the perceived legitimacy of institutions and regulatory compliance. His research focuses on how and why people choose to comply with laws and social norms. His work offers key insights on how to promote self-protective behaviour in contexts of risk, such as tsunami resilience.

I start this reflection from the hypothesis that every regulatory action by institutions and targeting citizens in risk management corresponds to a community reaction, which can be positive (in agreement with the regulation) or negative (contrary, i.e. non-compliance) (Jackson et al., 2012). The behaviour that citizens assume when faced with a natural risk management regulation (and risks in general) may depend on several variables

2 A similar approach was used to contextualise social vulnerability to natural hazards in three European countries. To read more, I recommend reading: Kuhlicke et al., 2011 (see references)

that mainly gravitate on two different levels, strongly correlated between them especially if we look at the final objective, that is, the effective and rational action of risk mitigation for the population. The first level lies in the strength and authority of the institution issuing the norm. An institution perceived by the community as legitimate, reliable and fair, and which invests in dialogue with the population and in building a sense of participation and trust, will receive the support of the public in issuing instruments for the mitigation and management of individual and collective safety. According to Tyler, in this way, the public will be more inclined to accept and respond positively to regulations, and consequently adopt behaviour appropriate to the situation in compliance with the regulations in force (*procedural justice*). The second – and equally important – level concerns the reception, assimilation and understanding of legislation (*transparency*). In this process, civic education tools and the dissemination of clear and targeted information to different target groups play a crucial role. Several variables directly influence this level, including the dissemination of knowledge about natural hazards and, consequently, the cause that led the authorities to implement the legislation. In addition, awareness of the territorial context, acquired through direct experience and constant information, is equally relevant. Also decisive are aspects related to the ability to understand the regulation itself, the clarity of the language used, the simplicity of the instructions provided, and, last but not least, prior experience of past threats or events that have left their mark on the collective memory.

These two levels refer to the normative functions identified by Weber (see previous paragraph) and Tyler, emphasising the educational and behavioural role of the law. They encourage reflection on the importance of active contribution, both individual and collective, in the prevention and protection of people. They also mediate between the upstream and downstream components, promoting greater risk awareness and education on safe behaviour. Adapting Tyler's theory to the case of tsunami risk management, institutions responsible for civil protection build the trust of citizens at two different times: in peacetime and in crisis. Institutional bodies, competence centres and civil protection organisations, in peacetime, are required to carry out activities that increase the level of knowledge, preparedness and response of citizens in the event of a disaster. These include information campaigns, drills, field work and continuous information through media and social media. Field presence and continuous contact with the public foster preventive responses by the population based on individual and communi-

ty self-preparedness and strengthen citizens' trust in the authority. In this specific case, the predominant communication conveyed by platforms and applications is not able to achieve the same effectiveness as direct contact with the population (Cerase, 2017). This last factor emerges especially in those contexts where social and/or territorial vulnerabilities are known.

The time of crisis is an unbalanced situation (Shaluf et al., 2003) in which the Civil Protection agencies offer support to the populations through their territorial activities with monitoring and risk assessment, timely communication of warnings, coordination of rescue operations, evacuation, psychological assistance and the reconstruction phase while waiting for normality to be restored.

If citizens perceive that authorities act transparently, making decisions based on scientific data and working for the public benefit, they will be more likely to follow official guidelines, such as evacuation or taking safety measures (see also Paton, 2007; Paton, 2008.

Individuals tend to comply with laws when they feel that decision-making processes are fair, that their concerns are heard and that they can participate in some way in decisions affecting them. Therefore, in risk prevention contexts, involving local communities in civil protection strategies and providing them with clear and accessible information strengthens the perceived legitimacy of institutions by predisposing the individual to regulatory acceptance. The right predisposition of the individual ensures that, in addition to passive regulatory compliance (compliance with the norm), proactive community behaviour towards the hazard situation is stimulated. The correlation between regulatory compliance, risk awareness and the inclusion of local communities in the decision-making process leads to what I would define as 'hybridisation of tsunami resilience'. Namely, the process of vertical (mixed top-down and bottom-up) and horizontal (interdisciplinary) integration that strengthens a community's resilience and adaptation capacities in the face of tsunami risk. The result is a flexible and robust resilience model capable of combining innovative and adaptive tsunami risk response strategies.

2.4. SELF-PROTECTIVE BEHAVIOUR AND RESILIENCE IN COASTAL COMMUNITIES. A GROWING LITERATURE.

Promoting self-protective behaviour at both the individual and community level to mitigate coastal hazards and tsunami risk has become a global pri-

ority in disaster risk reduction (DRR) policies, especially since the devastating Indian Ocean tsunami in 2004. This catastrophic event, also known as the Sumatra tsunami, caused the deaths of more than 230,000 people and extensive damage in several countries, highlighting the vulnerability of coastal communities to this type of natural hazard. Since then, fostering prevention strategies, disseminating risk knowledge and implementing early warning systems have become central elements of global initiatives to improve resilience against natural disasters, emphasising the need for collective action at the global level (Athukorala & Resosudarmo, 2005).

The 2004 Sumatra earthquake is one of the most devastating - and widespread in the media - recent tsunami events to hit the shores of multiple oceans (Murthy, 2013). Between the 18th and 19th centuries until today, there have been several tsunamis that could be described as global, i.e. which have produced effects of varying magnitude and casualties in nations tens of thousands of kilometres from each other across oceans. This is due to the physical and energetic characteristics of the phenomenon, which I will not describe here, and which you will be able to explore in depth in a vast literature.

To better understand the frequency with which these events occur – and considering the data from historical archives – it is useful to mention some of the major global events that have challenged international communities and helped to shape their resilience capabilities. These disasters have not only revealed global vulnerabilities but have also pushed societies to improve their prevention and response strategies, thereby strengthening collective resilience. These disasters not only revealed global vulnerabilities, but also prompted societies to improve their prevention and response strategies, enhancing collective resilience. These include the tsunami caused by the eruption of the Krakatoa volcano in Indonesia in 1883, which spread across the Indian Ocean and reached the Pacific Ocean coasts of South Africa and Australia. The Aleutian Islands earthquake and tsunami in Alaska in 1946. In that case, tsunami waves propagated in the Pacific Ocean and reached countries thousands of kilometres away (Hawaii Islands, coasts of California and Oregon). The Valdivia earthquake and tsunami in Chile in 1960. This was the strongest earthquake ever recorded in history. The tsunami waves, in that case, caused deaths thousands of kilometres away - also due to the absence of warning systems on a local and global scale. The event caused, 22 hours later, loss of life in Japan and on the Hawaiian Islands and produced significant damage in the Philippines and New Zealand. Similar events, although of different intensity occurred

in 1952 in Russia and in 1964 in Alaska. In the recent past, events that produced widespread effects affecting several nations include those in 2004, as already mentioned, then in 2005 in Indonesia, in 2007 in the Solomon Islands, in 2009 in Samoa, and in 2011 in Japan. The latter event was similar in significance to the Sumatra tsunami, caused around 16,000 casualties and a nuclear disaster, and affected several nations such as the west coast of the United States, the Hawaiian Islands, Chile and other countries bordering the Pacific Ocean. The most recent tsunamigenic event that affected in a major way all the Oceans including the Atlantic Ocean and in a widespread way almost all the international seas (some anomalous variations were also observed in the Mediterranean Sea) dates back to 2022. I refer to the volcanic eruption and tsunami of Hunga Tonga-Hunga Ha'apai, in the Pacific Ocean north of Tonga. In this case, however, the early warning systems were effective, and warnings were issued in all nations affected to varying magnitudes. Nevertheless, two fatalities were recorded in Peru, thousands of kilometres away[3].

These events prompted an increasing and widespread scientific production on risk perception and the psychological factors that interact with individual and collective behaviour, at best positively interfering with the growth of community resilience.

In Japan, after the 2011 tsunami, Yamori (2013) conducted a study on a local cultural practice that best expresses the concept of self-protection, identified in the Japanese term 'Tendenko', literally translated as "everyone for himself/herself". Tendenko has its origins in the Tohoku region that has experienced numerous disasters and tsunamis over time. It represents an imperative of individual action against the hazard in the need to save oneself i) individually ii) without thinking of those around, whether family, friend or stranger iii) according to one's self-acquired knowledge of the threat. This practice, ethically and culturally unrelated to our culture (I refer to Italian culture), prioritises the safeguarding of oneself as an individual. Such a culture involves a great amount of knowledge derived from a deep-rooted experience of hazardous natural phenomena associated with a culture of risk management deeply embedded at every level, coupled with clear, concise laws and effective territorial planning tools for risk reduction and self-protection; differently from some of the Indonesian

3 For more details on historical and recent tsunamis, please refer to the National Oceanic and Atmospheric Administration (NOAA) tsunami catalogue (namely: NCEI/WDS Global Historical Tsunami Database). The full reference is listed in the references.

localities studied by Hall (2022) where there is no unified culture and unified response as found in the Tohoku area of Japan. Hall's study, in fact, found differences in the degree of self-protection and self-efficacy of the respondents. Indeed, major differences can be seen by gender. Women perceive themselves to be more vulnerable than men in the event of an adverse event. Differences also emerge by geographical area. The research covers various cities and islands, and one factor that clearly emerges in terms of self-protective behaviour is religious beliefs. Muslim adolescents perceive themselves to be more vulnerable and less ready to react than their Catholic and Protestant peers. The Indonesian study shows how community action policies, including active involvement of citizens through participation in public assemblies for risk management planning and identifying gathering areas and escape routes help increase the sense of self-protection and lead to greater community resilience. Finally, the effectiveness of field training and continued participation in educational activities emerges.

An additional, not secondary aspect in terms of individual self-protective behaviour in response to tsunamis and increased community resilience is the individual's physical preparedness and positive perception of the environment in which one finds oneself (Imamura & Anawat, 2008; UNESCO-IOC., 2019). This last element is crucial as it recalls the responsibilities of local authorities in the proper communication of risk and the clear indication of evacuation routes and behaviour that must be implemented in the event of an emergency (Buylova et al., 2019).

3. TSUNAMI RISK IN ITALY. AN UNDERESTIMATED RISK, AT PRESENT.

Tsunami risk is defined as the probability that a causal event (earthquake, volcanic eruption, volcano flank collapse, aerial or submarine landslide, or meteorological event) triggers a series of tidal waves that impact the coastline and cause damage to people or property (UNISDR, 2009; NOAA, 2021). This first assumption contains, in its entirety, the product of the three components of the risk formula: Hazard X Vulnerability X Exposure. Given the extensive bibliography on the subject, I refrain from further consideration in this regard.

Italy, historically and recently, has been affected by several tsunamis of different magnitudes. Since 1900 there have been 18 tsunamis for

which an anomalous sea level variation has been recorded. The largest of these is the 1908 tsunami, caused by a strong earthquake in the Ionian Sea. In the past twenty years, events related to the eruptive activity of the Stromboli volcano have caused tsunamis of varying magnitude. The largest one occurred in 2002. In 2019, 2022 and 2024 there have been other episodes of collapses of accumulated material on the sciara del fuoco (northern slope of the volcano) that have caused the early warning system to be activated or the alert threshold to be exceeded (Maramai et al., 2019a; Maramai et al., 2019b).

Italy is located in the centre of the Mediterranean Sea and the Mare Nostrum is one of the basins with a large number of submarine and aerial tsunamigenic sources (the former are mostly concentrated near the plate margins, the latter are linked to volcanic activity but also to large rocky ridges that could collapse and cause local tsunamis, even disastrous ones). Our geographical location, going back to the risk formula, greatly increases the hazard factor. Elements such as urban sprawl and the tendency to populate the coastal areas of our country, where some of the largest metropolitan cities are located, greatly increase exposure; not least, the great vulnerability to tsunamis of coastal structures. High-impact industrial complexes, large port facilities, infrastructure (residential and tourism) and high-frequency communication networks, such as railways and highways increase exposure and vulnerability factors. In this chapter, I have focused on tsunami risk since my research interest is oriented purely on tsunamis. The preceding factors increase the risks associated with marine phenomena and climate change widely. Phenomena such as sea-level rise, storm surges, flooding and coastal erosion similarly impact or even significantly increase and interfere with each other and with tsunami risk. These aspects will need to be increasingly considered in the future. Since 2018, INGV - in collaboration with the Civil Protection - has been carrying out activities to study tsunami risk perception on the population. To date, the following have been surveyed: i) residents in the coastal municipalities of all Italian regions; ii) two samples (panels) representative of the entire national population, divided by quotas; iii) students of some high schools; iv) tourists who visit the island of Stromboli in the summer (spending a few hours or several days on the island;) v) the inhabitants of the island of Stromboli through in-depth interviews and focus groups.

What widely emerges is an underestimation of tsunami risk expressed in a general low risk perception. In some coastal areas affected by

tsunamis in the past, historical memory helps to maintain better than average levels of tsunami risk perception. This is especially evident in Calabria, Sicily and Stromboli Island (local inhabitants level). Respondents mostly acquire information through the mainstream media (TV). It is different for younger respondents who use smartphones and draw information about tsunamis from social platforms or scientific, albeit unaccredited, channels. I will not elaborate further on the results of this extensive survey as there are several publications in scientific journals (Cerase et al., 2019; Cugliari et al., 2022a; Cugliari et al., 2022b; Moreschini et al., 2024; Amato et al., 2024).

What emerges, however, from a general reflection, is a lack of attention paid to this type of risk at all levels. This is evident in the lack of territorial interventions of various types: informative, dissemination, (local) regulatory and applicative. Communities have a poor perception and they underestimate this risk as widely as risks from the sea because they do not receive enough information and few actions are taken in this regard. Consequently, the behaviour they would adopt in case of an alert or a situation requiring a rational reaction would be inadequate.

4. TSUNAMI RISK MANAGEMENT ON ITALIAN COASTLINES. PARTICIPATORY OBSERVATION INSIGHTS.

From a regulatory and management perspective, the Italian Civil Protection Code, embodied in Legislative Decree 1/2018, represents the main legislative reference for emergency management in Italy (G.U. 1/2018). This Decree includes tsunami risk management and has reorganised the entire civil protection system, giving the competent authorities responsibilities in preventing, managing and overcoming emergencies. Specifically, the activities included in the Decree concern: A) tsunami risk prevention and mitigation carried out by the competent bodies (INGV and ISPRA), which provide the scientific assessment and primary information, useful for the development of warning plans and coastal inundation belts; B) vertical coordination between institutions (central government, regions, provinces and municipalities) by the Civil Protection Department, which is responsible for emergency management at the various levels; C) the development and implementation of emergency plans at the various levels (national/local). In 2017, the Italian Tsunami Alert System (SiAM) was established,

which includes three key bodies for tsunami risk management: the Civil Protection Department; INGV and ISPRA. The SiAM, which operates in the wider Mediterranean context of the NEAMTWS (North-Eastern Atlantic, Mediterranean and connected seas Tsunami Warning System) allows for the timely sharing of data and information to issue an alert in the event of an event and guarantees the monitoring, issuing of the alert and its dissemination. The three points are guaranteed by the close interaction of the three constituent bodies (ISPRA, INGV and DPC).

Tsunami risk management and mitigation interventions, shifting the point of observation to the regional and then local level, are coordinated through an 'inverted pyramid' process by the Italian national Civil Protection Department, which issues guidelines to the regions and then individual municipalities transpose and implement them (Paleari, 2018). The regions are, therefore, responsible for supporting and supervising coastal municipalities in the drafting and subsequent implementation of Municipal Emergency Plans for tsunami risk.

Individual municipalities, in developing their own Municipal Tsunami Risk Emergency and Management Plans, must therefore follow national directives and comply with three key points:

i) learning and verifying the areas at risk of flooding identified by ISPRA and identifying specific local characteristics requiring special attention (presence of industrial complexes, civil dwellings, accommodation facilities, school facilities, etc. in the inundation areas); ii) developing evacuation plans, routes and procedures tailored to the territory; iii) training and raising awareness of the population also through drills and dissemination of information material. Today, the gap between the legislation, briefly described above, and the actions on the ground carried out by coastal municipalities is still significant. The concept of '*Festina Lente'*, a two-speed system proposed at the beginning of this chapter, becomes evident in the transition between legislation and local action.

From an institutional and SiAM system perspective, much has been done. Inundation areas have been mapped for all of Italy, there is a good network of tide gauges placed in harbours and a dense network of seismometers for an alert to be issued in the event of a tsunami well below the timeframe required by the regulations.

There are two, maybe three, Italian coastal municipalities where the national tsunami risk management guidelines have so far been converted into products. And not entirely.

We must recognise the efforts made by Minturno municipality, in the province of Latina, in southern Lazio, which has installed vertical signs, mapped sensitive structures in inundation areas, and identified collection points and areas from which to manage a possible tsunami alert. It has also carried out '*table top*' and field exercises, involving the public, particularly students among the weaker segments of the population, and has a siren system to sound the alarm. The municipality of Palmi, in the province of Reggio Calabria, and the municipality of Anzio, in the province of Rome, have put up vertical signs, as indicated by the regulations for the management of tsunami risk. Other municipalities are implementing the guidelines, such as the municipality of Otranto in the province of Lecce, and the municipality of Lipari in the province of Messina, in the specific context of Stromboli.

These actions received a boost in the other coastal municipalities, except for the municipality of Anzio (RM), following the proposal of the INGV and the DPC to join the international tsunami risk mitigation programme promoted by UNESCO: Tsunami Ready (UNESCO-IOC, 2020).

However, I prefer not to go into details here about the process for achieving recognition as a Tsunami Ready municipality. However, I consider it crucial to point out how this virtuous programme aims to provide practical tools and guidelines for communities to develop the capacity to respond effectively to a tsunami emergency, reducing vulnerability and increasing risk awareness. It is a standardised, point-based model (indicators) that supports step by step all levels of the community (from institutions to stakeholders to citizens) in the tsunami risk mitigation process and provides for strong vertical and horizontal stakeholder interaction.

In the remaining Italian coastal municipalities, there are no clear signs of the learning and conversion of tsunami risk management guidelines into mitigation actions.

5. CONCLUSIONS

The chapter aims to provide different interpretations, according to sociological and sociology of law approaches, to emphasise the importance of self-protective behaviour based on the logic of conscious action to increase the resilience of coastal communities to tsunami risk. From the considerations conducted so far, a clear disconnect emerges between the scientific/regulatory production in the field of tsunami risk mitigation, both in the

international context and in local contexts, compared to what is then perceived by citizens and, even more, by the actions that, based on the tools available to the community, would be implemented. This contribution aims to provide interpretative cues that can help decision-makers and public administrations, through the reinterpretation of regulations in a sociological key, to make regulations more effective and to reduce the gap between the 'Upstream' component (those who assess risks and draw up mitigation regulations) and the 'Downstream' component (those who receive provisions and decode them into behaviour). Different international examples such as Japan, Indonesia and New Zealand make it clear how important it is to adapt regulations and consequent actions to the local context and target audience so that citizens have greater trust in institutions. Institutions, in this process, will have to offer communities information that is simple, clear, accessible, fair and even more so, shared a priori with the target community. This latter step of sharing choices, of setting aside a top-down logic, is struggling to take off. The consequences are evident in various Italian contexts, as for example on the island of Stromboli (ME), where lack of communication, of participatory processes and of sharing local management choices generates friction at various levels. This friction disincentivises the population's response i) to act consciously in the event of an emergency, ii) to carry out continuous actions for risk mitigation, iii) to participate in decision-making processes, should they be proposed, and iv) to place trust in institutions that are seen as external and extraneous entities, bearers of interests and predatory for local activities. These aspects have emerged from my personal experience shared with some INGV colleagues during the interviews mentioned earlier and during the ten days I spent on the island surveying tourists' tsunami risk perception. At this point I do not think this chapter can have a conclusion. I would, however, close with an observation I gained from a meeting I attended during my PhD visit to New Zealand: what I know influences what I do. If we take the individual into account, this reasoning translates into: what I know (awareness), influences what I do (self-management). If we take the community into account, we translate this into: social awareness influences relationship management. So, intentions influence actions, and consequently actions influence results.

BIBLIOGRAPHY

Amato, A. (2020). Some reflections on tsunami Early Warning Systems and their impact, with a look at the NEAMTWS. *Bollettino di Geofisica Teorica ed Applicata*.

Amato, A., Cugliari, L., Samperi, V., Funiciello, F. and De Filippis, L. (2024) "Tsunami at school. An experimental strategy to increase students' risk perception", *Annals of Geophysics*, 67(2), p. TP211. doi: 10.4401/ag-9063.

Athukorala, P. C., & Resosudarmo, B. P. (2005). The Indian Ocean tsunami: Economic impact, disaster management, and lessons. *Asian economic papers*, *4*(1), 1-39.

Berkes, F., & Ross, H. (2013). Community resilience: Toward an integrated approach. *Society & natural resources*, *26*(1), 5-20. https://doi.org/10.1080/08941920.2012.736605

Bulkeley, H., Schroeder, H., Janda, K., Zhao, J., Armstrong, A., Chu, S. Y., & Ghosh, S. (2011). The role of institutions, governance, and urban planning for mitigation and adaptation. *Cities and climate change: Responding to an urgent agenda*, *62696*, 125-159.

Castleden, M., McKee, M., Murray, V., & Leonardi, G. (2011). Resilience thinking in health protection. *Journal of public health*, *33*(3), 369-377. https://doi.org/10.1093/pubmed/fdr027

Cerase, A., Crescimbene, M., La Longa, F., and Amato, A. (2019): Tsunami risk perception in southern Italy: first evidence from a sample survey, Nat. Hazards Earth Syst. Sci., 19, 2887–2904, https://doi.org/10.5194/nhess-19-2887-2019

Cerase, A. (2017). *Rischio e comunicazione: Teorie, modelli e problemi*. Franco Angeli (in italian)

Cugliari, L., Crescimbene, M., La Longa, F., Cerase, A., Amato, A., and Cerbara, L. (2022a): Tsunami risk perception in central and southern Italy, Nat. Hazards Earth Syst. Sci., 22, 4119–4138, https://doi.org/10.5194/nhess-22-4119-2022

Cugliari, L., Cerase, A., & Amato, A. (2022b). Tsunami risk perception, a state-of-the-art review with a focus in the NEAM region. *Frontiers in Earth Science*, *10*, 995536.

Das, P.S. (2023). Good Governance Strategies for Disaster Management and Risk Reduction. In: Singh, A. (eds) International Handbook of Disaster Research. Springer, Singapore. https://doi.org/10.1007/978-981-16-8800-3_145-1

Dominey-Howes, D., Goff, J. Tsunami Risk Management in Pacific Island Countries and Territories (PICTs): Some Issues, Challenges and Ways Forward. *Pure*

Appl. Geophys. 170, 1397–1413 (2013). https://doi.org/10.1007/s00024-012-0490-8

Fernandez, G., & Ahmed, I. (2019). “Build back better” approach to disaster recovery: Research trends since 2006. *Progress in Disaster Science*, *1*, 100003. https://doi.org/10.1016/j.pdisas.2019.100003

Haigh, R., Sakalasuriya, M.M., Amaratunga, D., Basnayake, S., Hettige, S., Premalal, S. and Jayasinghe Arachchi, A. (2019), “The upstream-downstream interface of Sri Lanka’s tsunami early warning system”, *International Journal of Disaster Resilience in the Built Environment*, Vol. 11 No. 2, pp. 219-240. https://doi.org/10.1108/IJDRBE-07-2019-0051

Hall, S., Sloan-Aagard, C., Harris, R., Emmett, C., Prasetyadi, C., Pettersson, J., Cope, A., & Hamson Cox, M. (2022). Perceptions of tsunami susceptibility and self-efficacy among adolescents in Indonesia: The influence of gender, religion, location, age, hazard information source, and past experience. *International Journal of Disaster Risk Reduction*, *79*, 103151. https://doi.org/10.1016/j.ijdrr.2022.103151

Imamura, F., & Anawat, S. (2008). *Tsunami preparedness: Lessons from the Great Sumatra-Andaman Tsunami in 2004*. Journal of Earthquake and Tsunami, 2(1), 1-30. https://doi.org/10.1142/S1793431108000279

Jackson, J., Bradford, B., Hough, M., Myhill, A., Quinton, P., & Tyler, T. R. (2012). Why do People Comply with the Law?: Legitimacy and the Influence of Legal Institutions. *The British Journal of Criminology*, *52*(6), 1051–1071. https://doi.org/10.1093/bjc/azs032

Kasperson, R. E., & Pijawka, K. D. (1985). Societal responses to hazards and major hazard events: Comparing natural and technological hazards. *Public Administration Review*, *45*, 7–18. https://doi.org/10.2307/3134993

Kennedy, J., Ashmore, J., Babister, E., & Kelman, I. (2008). *The meaning of ‘build back better’: Evidence from post tsunami Aceh and Sri Lanka*. Journal of Contingencies and Crisis Management, 16(1), 24-36. https://doi.org/10.1111/j.1468-5973.2008.00529.x

Khan, S. M., Shafi, I., Butt, W. H., Diez, I. D. L. T., Flores, M. A. L., Galán, J. C., & Ashraf, I. (2023). A systematic review of disaster management systems: approaches, challenges, and future directions. *Land*, *12*(8), 1514. https://doi.org/10.3390/land12081514

Kuhlicke, C., Scolobig, A., Tapsell, S. *et al.* Contextualizing social vulnerability: findings from case studies across Europe. *Nat Hazards* 58, 789–810 (2011). https://doi.org/10.1007/s11069-011-9751-6

Lotfi, M. and Larmour, A. (2022), “Supply chain resilience in the face of uncertainty:

how horizontal and vertical collaboration can help?", *Continuity & Resilience Review*, Vol. 4 No. 1, pp. 37-53. https://doi.org/10.1108/CRR-04-2021-0016

Magis, K. (2010). Community resilience: An indicator of social sustainability. *Society and natural resources*, *23*(5), 401-416. https://doi.org/10.1080/08941920903305674

Main, S., & Hammond, L. (2008). Best practice or most practiced? Pre-service teachers' beliefs about effective behaviour management strategies and reported self-efficacy. *Australian Journal of Teacher Education (Online)*, *33*(4), 28-39. https://search.informit.org/doi/10.3316/ielapa.799867373340955

Maramai A., Graziani L., and Brizuela B. (2019a). Euro-Mediterranean Tsunami Catalogue (EMTC), version 2.0. Istituto Nazionale di Geofisica e Vulcanologia (INGV). https://doi.org/10.13127/tsunami/emtc.2.0

Maramai A., Graziani L., and Brizuela B. (2019b). Italian Tsunami Effects Database (ITED). Istituto Nazionale di Geofisica e Vulcanologia (INGV). https://doi.org/10.13127/tsunami/ited.1.0

Margheriti, L., Nostro, C., Cocina, O., Castellano, M., Moretti, M., Lauciani, V., et al. (2021). Seismic surveillance and earthquake monitoring in Italy. *Seismological Research Letters*, 92(3), 1659–1671. https://doi.org/10.1785/0220200380

Massa, A., & Comunello, F. (2024, February). *Analyzing effective risk communication: evidence from a literature*. In *BOOK OF ABSTRACTS* (Vol. 1, p. 292).

McEntire, D. A. (2021). *Disaster response and recovery: strategies and tactics for resilience*. John Wiley & Sons.

Messer, N. M. (2003). The role of local institutions and their interaction in disaster risk mitigation: A literature review. *Food and Agriculture Organization, United Nations*.

Miranda, S. M., & Kim, Y. M. (2006). Professional versus political contexts: institutional mitigation and the transaction cost heuristic in information systems outsourcing. *Mis Quarterly*, 725-753. https://doi.org/10.2307/25148747

Mitra, A., & Shaw, R. (2023). Systemic risk from a disaster management perspective: A review of current research. *Environmental Science & Policy*, *140*, 122-133. https://doi.org/10.1016/j.envsci.2022.11.022

Moreschini, I., Cugliari, L., Cerbara, L. *et al.* Tsunami risk perception of the touristic population of Stromboli Island: towards effective risk communication strategies. *Nat Hazards* (2024). https://doi.org/10.1007/s11069-024-06845-1

Murthy, D. (2011). New media and natural disasters: Blogs and the 2004 Indian Ocean tsunami. *Information, Communication & Society*, *16*(7), 1176–1192. https://doi.org/10.1080/1369118X.2011.611815

National Geophysical Data Center / World Data Service: NCEI/WDS Global

Historical Tsunami Database. NOAA National Centers for Environmental Information. doi:10.7289/V5PN93H7

National Oceanic and Atmospheric Administration (NOAA). (2021). *Tsunami risk and preparedness*. NOAA. https://www.tsunami.noaa.gov/risk.html

Oetjen, J., Sundar, V., Venkatachalam, S., Reicherter, K., Engel, M., Schüttrumpf, H., & Sannasiraj, S. A. (2022). A comprehensive review on structural tsunami countermeasures. *Natural Hazards*, *113*(3), 1419-1449. https://doi.org/10.1007/s11069-022-05367-y

Paleari, S. (2018). Natural disasters in Italy: do we invest enough in risk prevention and mitigation? *International Journal of Environmental Studies*, *75*(4), 673–687. https://doi.org/10.1080/00207233.2017.1418995

Parsons, M., Glavac, S., Hastings, P., Marshall, G., McGregor, J., McNeill, J., ... & Stayner, R. (2016). Top-down assessment of disaster resilience: A conceptual framework using coping and adaptive capacities. *International Journal of Disaster Risk Reduction*, *19*, 1-11. https://doi.org/10.1016/j.ijdrr.2016.07.005

Paton, D. (2007). Preparing for natural hazards: the role of community trust. *Disaster Prevention and Management: An International Journal*, *16*(3), 370-379. https://doi.org/10.1108/09653560710758323

Paton, D. (2008). Risk communication and natural hazard mitigation: how trust influences its effectiveness. *International Journal of Global Environmental Issues*, *8*(1-2), 2-16. https://doi.org/10.1504/IJGENVI.2008.017256

Pearson, L., & Pelling, M. (2015). The UN Sendai framework for disaster risk reduction 2015–2030: Negotiation process and prospects for science and practice. *Journal of Extreme Events*, *2*(01), 1571001. https://doi.org/10.1142/S2345737615710013

Presidenza del Consiglio dei Ministri. Dipartimento della Protezione Civile. (2018). *Decreto Legislativo n. 1 del 2 gennaio 2018, Codice della Protezione Civile*. Gazzetta Ufficiale della Repubblica Italiana, Serie Generale, n. 17 del 22 gennaio 2018.

Rafliana, I., Jalayer, F., Cerase, A., Cugliari, L., Baiguera, M., Salmanidou, D., Necmioglu, Ö., Aguirre Ayerbe, I., Lorito, S., Fraser, S. et al. (2022): Tsunami risk communication and management: Contemporary gaps and challenges, *Int. J. Disast. Risk Re.*, 70, 1–30, https://doi.org/10.1016/j.ijdrr.2021.102771

Roland, G. (2004). Understanding institutional change: Fast-moving and slow-moving institutions. *St Comp Int Dev* 38, 109–131. https://doi.org/10.1007/BF02686330

Sakalasuriya, M., Amaratunga, D., Haigh, R., Hettige, S., (2018). “A Study of The Upstream-Downstream Interface in End-to-End Tsunami Early Warning

and Mitigation Systems". *International Journal on Advanced Science, Engineering and Information Technology*, vol. 8, no. 6, Dec. 2018, pp. 2421-7, doi:10.18517/ijaseit.8.6.7487.

Selva, J., Amato, A., Armigliato, A., Basili, R., Bernardi, F., Brizuela, B., & Zaniboni, F. (2021). *Tsunami risk management for crustal earthquakes and non-seismic sources in Italy*. *La Rivista del Nuovo Cimento, 44*(2), 69-144. https://doi.org/10.1007/s40766-021-00016-9

Shaluf, I.M., Ahmadun, F. and Mat Said, A. (2003), "A review of disaster and crisis", *Disaster Prevention and Management*, Vol. 12 No. 1, pp. 24-32. https://doi.org/10.1108/09653560310463829

Sutton, J., & Tierney, K. (2006). Disaster preparedness: Concepts, guidance, and research. *Paper presented at Fritz Institute Assessing Disaster Preparedness Conference* Sebastopol, California: Fritz Institute.

Tsuchiya, Y., & Shuto, N. (Eds.). (1995). *Tsunami: Progress in prediction, disaster prevention and warning* (Vol. 4). Springer Science & Business Media.

UNESCO-IOC. (2019). *Tsunami readiness and preparedness strategies*. UNESCO Intergovernmental Oceanographic Commission. https://unesdoc.unesco.org/ark:/48223/pf0000368479

Intergovernmental Oceanographic Commission (IOC) of UNESCO. (2020). *NEAM Tsunami Ready: Guidelines for the Recognition of Tsunami Preparedness in Coastal Communities in the North-Eastern Atlantic, Mediterranean, and Connected Seas (NEAM) Region*. Paris: UNESCO. https://doi.org/10.25607/OBP-1052

United Nations Office for Disaster Risk Reduction. (2015). *Sendai framework for disaster risk reduction 2015–2030*. UNDRR. https://www.undrr.org/publication/sendai-framework-disaster-risk-reduction-2015-2030

UNISDR. (2009). *Terminology on disaster risk reduction*. United Nations International Strategy for Disaster Reduction (UNISDR). https://www.unisdr.org/files/7817_UNISDRTerminologyEnglish.pdf

United Nations International Strategy for Disaster Reduction. (2005). *Hyogo Framework for Action 2005-2015: Building the Resilience of Nations and Communities to Disasters*. UNISDR. https://www.unisdr.org/we/inform/publications/1037

Valbonesi, C., Amato, A., & Cerase, A. (2019). The INGV Tsunami Alert Centre: analysis of the responsibility profiles, procedures and risk communication issues. *Bollettino di Geofisica Teorica ed Applicata*. https://doi.org/10.4430/bgta0252

Wang, J., He, Z., & Weng, W. (2020). A review of the research into the relations

between hazards in multi-hazard risk analysis. *Natural Hazards*, *104*(3), 2003-2026. https://doi.org/10.1007/s11069-020-04259-3

Weber, M. (1958). *The Protestant ethic and the spirit of capitalism* (T. Parsons, Trans.). Scribner. (Original work published 1905)

Weber, M. (1978). *Economy and society: An outline of interpretive sociology* (G. Roth & C. Wittich, Eds.). University of California Press. (Original work published 1922)

Yamori, K. (2013). Revisiting the Concept of Tsunami Tendenko: Tsunami Evacuation Behavior in the Great East Japan Earthquake. In H. Kawase (Ed.), *Studies on the 2011 Off the Pacific Coast of Tohoku Earthquake* (pp. 49–63). Springer Japan. https://doi.org/10.1007/978-4-431-54418-0_5