

Article

Policy Recommendations for Integrating Resilience into the Management of Cultural Landscapes

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Abstract: The perspectives of resilience and cultural landscape share common interests in planning, managing, and protecting socio-ecological systems. Although the principles of the Yokohama, Hyogo, and Sendai frameworks may be used in a variety of geographical contexts due to their general design, the implementation of these frameworks in cultural landscapes is seldom discussed. Our theoretical research is the first step in an ongoing effort to explore how urban governance and policy may provide room for enhancing cultural heritage resilience against natural hazards. A meta-synthesis of international guidelines on cultural landscapes, resilience, and disaster risk reduction serves as the foundation for the research methodology used in this study. The research findings highlight that cultural landscapes must be managed with political, social, and economic support to stay resilient, and therefore, the first step towards this goal is to integrate cultural heritage into the disaster risk reduction plan at a national level. Furthermore, cultural landscapes need a bottom-up participatory framework and more internship opportunities to bring together the government, first responders, site managers, and the local community.



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1. Introduction

A natural hazard is an extreme event that occurs naturally and causes harm to humans. Geological risks and hydrological, meteorological, and biological hazards are the four main classifications of natural hazards [1]. Due to climate change, the number and intensity of natural hazards are growing exponentially. In 2018, for instance, 289 natural disasters impacted 61.7 million people and killed 10,733 individuals. Among the victims, 90% of them died due to climate change risks such as storms, hurricanes, and flooding [2]. The Yokohama Strategy and Plan of Action for a Safer World [3], the Hyogo Framework for Action 2005–2015 [4], and the Sendai Framework for Disaster Risk Reduction 2015–2030 [5] have all worked to strengthen the link between sustainable development and disaster risk reduction.

In 1994, following the United Nations World Conference on Natural Disaster Reduction in Yokohama, Japan, the Yokohama Strategy and Plan of Action for a Safer World was adopted. It is the first worldwide statement that provides standards for disaster preparation, mitigation, and prevention. It is suggested within the Yokohama Strategy that local actors are to be included in risk management practice, utilizing their knowledge in this field and the necessity of putting the disaster risk reduction process in their hands. In order to speed up the recovery process, this method made use of the local expertise and experience when dealing with disasters found in areas at risk [6].

In 2005, the World Conference on Disaster Reduction in Kobe, Japan, adopted the Hyogo Framework for Action (HFA). Its goal was to significantly mitigate disaster losses by 2015 in terms of lives, economic assets, and environmental assets. The document recommends five priority actions for this purpose: (i) ascertaining that disaster risk reduction is a

national and local priority, with an adequate governance basis in place to accomplish this; (ii) disaster risks should be continually identified, assessed, and monitored, and early warning systems need to improve; (iii) all levels of an organizational structure may benefit from additional knowledge, creativity, and training to create a safe and resilient environment; (iv) decreasing the risk factors that are already in place; and (v) strengthening disaster readiness in order to provide an effective response at all levels [4]. After implementing the Hyogo Framework for Action, Member States concluded that national and international emphasis must shift from protecting social and economic development against external shocks to holistically managing risks [7]. The notion of disaster risk management presented in the HFA represents a greater emphasis on risk preparedness and prevention as compared to the emphasis on response and recovery in the Yokohama Strategy. The HFA provides five areas of focus for action, as well as guiding concepts and methods for building disaster resilience into communities and infrastructure. However, the implementation the HFA at a local level was not assessed using a comparable reporting system, which suggests a lack of concern by international organizations towards assessing the community-level impacts of these disaster risk reduction strategies [8].

In March 2015, the United Nations World Conference on Disaster Risk Reduction in Sendai, Japan, adopted the Sendai Framework for Disaster Risk Reduction 2015–2030. The framework intends to reduce disaster risks and losses by 2030. The Sendai Framework for Disaster Risk Reduction 2015–2030 outlines four priorities for action to prevent new, and reduce existing, disaster risks: (i) understanding disaster risk; (ii) strengthening disaster risk governance to manage disaster risk; (iii) investing in disaster risk reduction for resilience; and (iv) improving disaster preparedness for effective response and to “build back better” in recovery, rehabilitation, and reconstruction [5]. The Sendai framework encourages regional and international organizations to help governments and other stakeholders implement this framework by establishing relevant sector policies and standards, monitoring systems, and enhancing capacity. However, to meet the goals of the framework, greater data and information management is required, as well as community-based efforts aimed at increasing resilience [9]. In light of the recent adoption of the Sendai framework, only time will tell how these four goals are actually implemented.

All three frameworks acknowledge some degree of participation by local communities in disaster risk reduction. However, there are significant disparities in the approaches taken by each framework and noticeable movement over time from the acknowledgement of local community participation to a more bottom-up approach to disaster risk reduction. Even though each framework seems to support community involvement, none of them explain how community involvement can best help achieve the framework’s goals or give advice on how to deal with the problems at the local level [8].

Depending on the local characteristics, some regions are more vulnerable than others to specific hazards [10]. The type and intensity of risk, the vulnerability level, and the exposure scale are all factors that contribute to the occurrence of a natural disaster in a region [11]. Regions must strengthen their resilience to deal with the wide range of natural hazards that threaten their livability and functionality [12]. By considering this requirement, the concept of resilience is increasingly being applied as an organizing principle to drive research design and enable better decision-making processes [13].

Cultural heritage is of paramount value to communities worldwide. Cultural heritage, both tangible and intangible, links us to the past and gives essential insights into our identities and development. It may contribute significantly to economic expansion, poverty alleviation, and sustainable development. The Convention Concerning the Protection of the World Cultural and Natural Heritage of UNESCO defines cultural heritage as monuments, groups of buildings, or sites that are of outstanding universal value from the point of view of history, art, or science. The term “cultural landscape” was added to this concept in 1992 when it expanded to encompass natural and human-created artwork [14]. Cultural landscapes are vulnerable to natural hazards, and climate change amplifies the urgency of addressing this issue [15]. The lack of effective policies [16] and the loss of traditional

knowledge will make cultural heritage resources more vulnerable to natural hazards [17,18]. Cultural heritage policies come from societal perceptions of which aspects of the past are worthy of conservation for future generations [19]. Understanding how people value their historic urban landscapes is of great importance in cultural heritage management practice [20].

In order to protect lives, livelihoods, and cultural heritage, it is essential to enhance the resilience of at-risk resources by integrating resilience into cultural heritage policies [21]. Despite the plethora of studies on urban resilience [22–24], research on the link between cultural landscapes and resilience is still limited and fragmented. This study tries to fill this gap by looking into how policy recommendations could make cultural landscapes more resistant to natural disasters.

2. Methodology

2.1. Procedure and Data Analysis

This study investigates how cultural heritage policies might improve the resilience of cultural landscapes against natural hazards. Due to the limited and fragmented studies that have been conducted to fill this gap, this research is the first step in an ongoing effort to investigate and develop an exhaustive understanding of the complicated relationships between resilience and cultural landscape management in the face of natural hazards. The scope of the investigation is confined to the improvement of governance, planning, and implementation at the local level. The research methodology employed by the researcher is based on a meta-analysis of international guidelines on cultural landscapes, resilience, and disaster risk reduction. In the first step, we review the literature on resilience and cultural landscape perspectives and international guidelines on disaster risk reduction. Then, we will discuss the factors and challenges associated with integrating the cultural landscape and resilience perspectives. The Cinque Terre in Italy is introduced as a cultural landscape affected by natural hazards in the following sections. Following up on the meta-synthesis, we developed a set of policy recommendations that point out how cultural landscapes might be made more resilient to natural disasters (Figure 1).

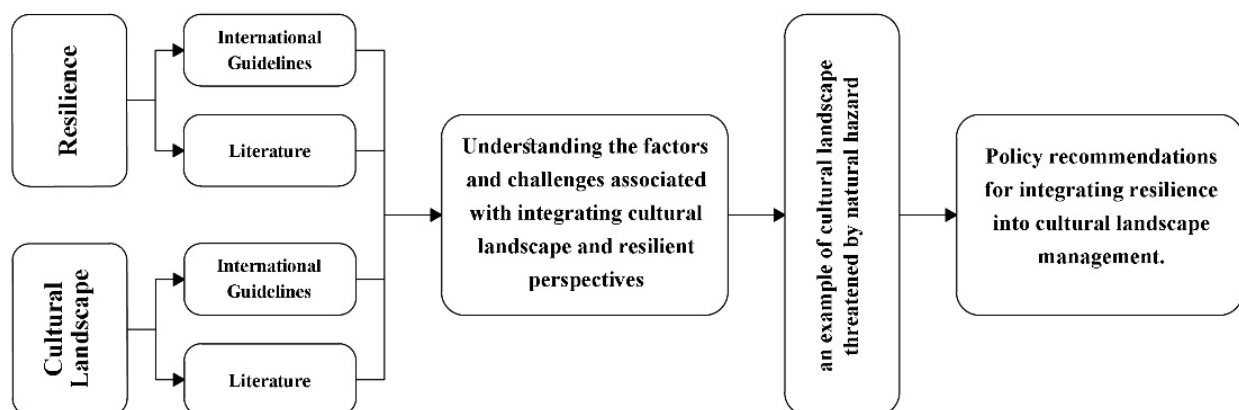


Figure 1. Schematic representation of the research procedure.

We used the “title/keywords/abstract” fields to find relevant papers published in the Web of Science Core Collection database from 2011 to 2021. Initial searches were conducted in January 2022, yielding 118 results. The abstracts of these publications were evaluated, and those that addressed the research issues outlined in the preceding section were chosen for further investigation. The Google Scholar alert system was utilized to refresh the article database. Furthermore, the snowballing strategy was used to incorporate additional relevant studies that were not found in the first database searches. The technique by which a literature review begins with a small number of studies and the relevant papers listed in the bibliography section of the examined studies are added to the review database throughout the process is known as “snowballing.” In all, 62 studies were examined and used to create

the initial draft of this publication. In order to finish this section, the ideas of resilience and cultural landscape were also looked at from the point of view of international documents.

The current obstacles to integrating the resilience and cultural landscape perspectives were identified based on the present data and using the inductive reasoning method. Inductive reasoning is a logical thinking process that integrates observations with experiential information to draw a conclusion. An internet search focused on European examples was conducted to identify a case study that has been impacted by natural hazards and learn about the socio-economic outcome of such a disaster in the landscape.

2.2. Concepts and Definition

It is helpful to provide a brief explanation of what is meant by fundamental terminology and ideas like “hazard”, “vulnerability”, “exposure” and “resilience.” According to the United Nations Office for Disaster Risk Reduction (UNISDR) [25]:

Hazard: “a dangerous phenomenon, substance, human activity or condition that may cause loss of life, injury or other health impacts, property damage, loss of livelihoods and services, social and economic disruption, or environmental damage.”

Vulnerability: “The characteristics and circumstances of a community, system or asset that make it susceptible to the damaging effects of a hazard”.

Exposure: “People, property, systems, or other elements present in hazard zones that are thereby subject to potential losses.”

Resilience: “The ability of a system, community or society exposed to hazards to resist, absorb, accommodate to and recover from the effects of a hazard in a timely and efficient manner, including through the preservation and restoration of its essential basic structures and functions.”

3. Findings

3.1. Discourses of Resilience

The term resilience derives from the Latin word “resilio”, which means “to bounce back” [26]. Resilience is a polysemic concept that has been used in a variety of disciplines [27]. Resilience, rather than resistance, is a new approach to thinking about disaster risk reduction. Research and policy interests have diverse definitions of “resilience.” They use it to create and construct their goals (Table 1). Resilience may be used for various issues, from climate change mitigation and adaptation to human development, disaster risk reduction, and global development [28]. According to the research, landscape resilience may be defined in three distinct ways. Resilience in engineering, ecological resiliency, and adaptive resiliency are all examples of this type of resilience. Engineering resilience theories emphasize the need to increase a physical infrastructure’s resistance and robustness to reduce its vulnerability to disasters [29]. According to Holling’s (1973) definition, ecological resilience measures the amount of disruption required to transform a system from one set of reinforcing processes and structures to another. Resilient systems can switch between multiple states or equilibrium regimes, which is an excellent example of one such resilient system [30]. Adaptive resilience acknowledges system complexity and dynamicity. In order to be resilient, a system must be capable of adapting at multiple scales, both in the short and long term, to the constantly shifting dynamics and complexities of the system [31,32].

Focusing on socio-ecological systems, Holling used the term resilience in 1973 to characterize three aspects of the changes that occur over time in an ecosystem. The initial objective was to characterize the “persistence of relationships within a system” and the “capacity of systems to absorb changes in state variables, driving variables, and parameters and continue to function”. In contrast to the assumption of a single equilibrium and global stability, the second concept acknowledged the existence of alternative and multiple states; thus, resilience was defined as “the size of a stability domain or the amount of disturbance a system could withstand before shifting to an alternative configuration”. The third realization was the abrupt and discontinuous nature of change, such as the rapid depletion of fish stocks or the breakout of spruce budworms in forests. Panarchy, as

opposed to hierarchy, was established by Gunderson and Holling (2002) and proposes that phases are not always sequential or fixed and that systems do not function in a single cycle but rather in a succession of nested adaptive cycles that operate and interact [38]. These insights have influenced how theorists and practitioners have conceptualized ecological systems and attempted to manage them.

Table 1. Characteristics of the concept of resilience according to various disciplines.

Resilience as	Definition of the Concept	Source
Absorption	To absorb adverse impacts	UNISDR (2009) [33]
Adaptive	The capacity of systems, institutions, humans, and other species to adapt to possible harm, seize opportunities, or deal with repercussions	Pelling (2011) [34]
Resistance	The capability of calculating the physical damage to the network caused by the hazard	Serre et al. (2018) [35]
Reaction	A system's potential to restructure and recover from change and disruption	Ahern (2011) [29]
To rebuild	The process of reorganizing while enduring change in order to substantially maintain the same function, structure, identity, and feedback	Walker et al. (2004) [36]
Learning	The extent to which the system may develop and expand its ability to learn and adapt.	Walker and Salt (2012) [37]

Landscape resilience studies have been heavily influenced by Holling's theory [39]. As an ecologist, he defined resilience as the ability of an ecological system to bounce back after being perturbed. More contemporary studies have turned their attention to disaster response and scenario processes as a way to understand the concepts [37]. Resilience theory elucidates complex socio-ecological systems and their long-term management [40], particularly in relation to climate change [41]. Resilience has been a central and persistent consideration in social-ecological studies [42], commonly defined as the ability of a system to recover or reorganize its function after a shock or disaster [43]. Ecological resilience theory may be incorporated into cultural landscapes, allowing for the transformative continuance of cultural heritage while also supporting its adaptability [44]. Using a social-ecological perspective, landscape planners may manage natural hazards beyond the current landscape threshold by dynamically identifying and managing landscape values.

However, implementing the concept of resilience is challenging when it comes to dealing with large and complex systems like cultural landscapes. As landscape systems get more complicated, one thing becomes clear: resilient environments must be built using more advanced and creative methods because of their inherent unpredictability. When faced with a natural hazard, the ability to envision alternate possibilities is crucial for turning the situation into an opportunity. It is precisely this ability that defines, or should characterize, broad planning.

In fact, traditional risk management focuses on identifying areas of vulnerability and devising strategies to reduce such exposure to damage. Vulnerability is a static term that describes the state of a system and is frequently assessed before an event occurs. However, planning entails being prepared for inventive transformation during periods of transition and inherent uncertainty [45]. On the other hand, resilience-oriented management emphasizes the importance of comprehending landscape dynamics and complexity and attempts to explain how these dynamics and feedbacks change over time and space. Because socio-ecological resilience theory recognizes systems as always evolving in nonlinear ways, it is a very relevant approach to coping with future climatic uncertainty [46]. In addition, several aspects of the Sendai framework must be implemented to enhance landscape resiliency. These include finding out about disaster risks and weak spots, making plans with vulnera-

ble groups, sharing information about the best ways to do things, and spending money on ways to protect lives and infrastructure [47].

International policy documents, such as the Hyogo Framework for Action 2005–2015 and the Sendai Framework for Disaster Risk Reduction 2015–2030, emphasize the importance of incorporating resilience thinking into landscape planning. Furthermore, by utilizing local knowledge and traditional practices, these documents suggest that participatory governance and planning can enhance landscape resiliency [48].

Community engagement enables decision-makers to comprehend the actual requirements of the community and build a framework for two-way learning, which is vital for executing sustainability-resilience initiatives. It also promotes the cultural values that distinguish each landscape [49]. Disaster management strives to reduce or prevent potential losses from hazards, provide timely and appropriate support to disaster victims, and ensure a speedy and successful recovery. The disaster management cycle describes the continual process by which governments, corporations, and civil society plan for and mitigate the effects of disasters, including reactions during and shortly after a disaster and recovery after a disaster has happened. Appropriate actions at all points in the cycle result in a higher readiness, better warnings, decreased susceptibility, or the prevention of disasters during the following cycle iteration. The entire disaster management cycle (Figure 2) entails the development of governmental policies and strategies to either change the causes of disasters or mitigate their effects on people, property, and infrastructure.

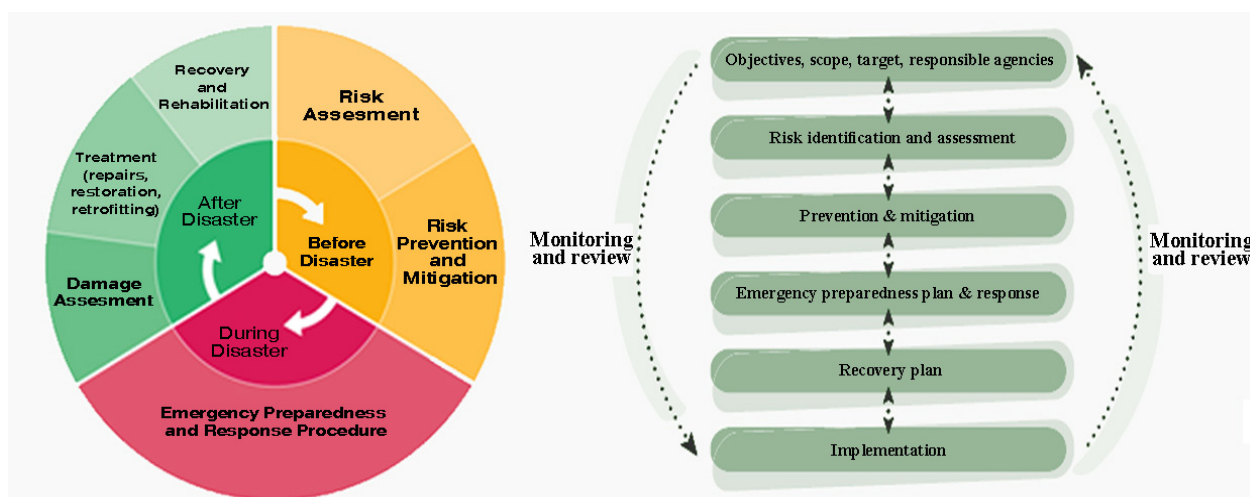


Figure 2. Schematic representation of the disaster risk management cycle.

Resilience research in cities highlights the significance of asking, “resilience of what, to what, and for whom?” [50]. The answer to the question “resilience for whom?” helps clarify what aspect of resilience-related abilities and characteristics may be improved by attaining desirable forms of urban development. “Robustness”, “stability”, “redundancy”, “resourcefulness”, “modularity”, “complexity”, “flexibility”, “multifunctionality”, “self-organization”, “adaptability”, and “efficiency” are used to describe these characteristics [30]. For instance, Allred et al. (2016) utilized a social-ecological approach to comprehend resilience in Jamaica Bay, New York. By questioning “resilience of what and for whom?” they demonstrated the significance of increasing the relationship between the local community and researchers in order to protect socio-ecological systems [51,52]. Therefore, a participatory approach to landscape planning and management is required when natural disasters are considered a social process in which the community is responsible for mitigation and recovery measures [47].

3.2. Discourse of Cultural Landscapes

The cultural landscape has a long history that may be traced back to a variety of fields other than heritage studies. In 1893, the German geographer Friedrich Ratzel defined a cultural landscape as a region altered by human activities [53]. In 1925, Carl O. Sauer introduced it to the English-speaking world as a natural environment modified by a cultural group [54]. Since the 1990s, the term “cultural landscape” has been used frequently in the context of cultural heritage research and conservation efforts [55].

The UNESCO World Heritage Convention of 1992 defines “cultural landscapes” as distinct landscapes characterized by “combined works of nature and man” that illustrate the evolution of human society and settlement over time, under the influence of physical constraints and/or opportunities posed by the natural environment, as well as successive social, economic, and cultural forces, both external and internal [56,57]. The European Landscape Convention introduces a (cultural) landscape as any part of the territory “perceived by people” whose character is the consequence of natural and/or human qualities interacting together [58]. In fact, cultural landscapes, as a part of cultural heritage resources, demonstrate a cultural group’s evolved and ongoing interactions with nature and the environment across time [59]. The European Landscape Convention and the UNESCO Convention preserve cultural landscapes through distinct means. The European Landscape Convention aspires to safeguard landscapes that are recognized at the national or regional levels and, to do so, it fosters cooperation with local communities [60]. The UNESCO Convention aims to protect only those areas that have been deemed to be of outstanding universal value [56].

Social-ecological systems can also be used to explain cultural landscapes [61]. Social-ecological systems, as well as cultural landscapes, both emphasize how human civilization and the environment interact [62]. The social-ecological systems (SES) idea, on the other hand, is much more directly linked to resilience thinking and incorporates themes such as nested systems, self-organization or adaptation, and nonlinearity [63]. This theory emphasizes the interconnectedness of nature and society as nested systems, which is in line with our intuitive knowledge of cultural landscapes. Nature and society are intimately interwoven. This paradigm was developed by Ostrom (2009) for well-defined common pool resource management scenarios and is a good example of social-ecological systems theory. A variety of human–environment connections are now included in the SES framework [64]. The SES framework expressly recognizes that a social-ecological system is situated in a wider context and is impacted by other socio-ecological systems and social, economic, and political influences.

Cultural landscapes have been steadily changing for millennia. Nonetheless, planners and site managers are already confronted with new conservation concerns as climate change exacerbates the severity of natural risks and uncertainty [18]. All of the uncertainties, including climate change risks, land abandonment, and forecasting model inaccuracies, necessitate the fostering of disaster risk management for cultural landscapes.

Despite the importance of incorporating resilience into cultural landscape management, international policy guidelines seldom address this topic. The World Heritage Committee requested the World Heritage Centre “in cooperation with the States Parties, Advisory Bodies, and other international agencies and nongovernmental organizations concerned by emergency interventions” to draft a risk preparedness strategy in 2004. At the 30th session of the World Heritage Committee in 2006, the strategy was first presented to the Committee members. After that, at its 31st meeting in 2007, the World Heritage Committee adopted a new Risk Reduction Strategy for World Heritage Properties. Protecting world heritage and contributing to sustainable development are the primary goals of the strategy. It aimed to help States Parties implement national disaster reduction policies and disaster risk reduction plans and systems for World Heritage properties located in their territory [65]. Five objectives are outlined in the strategy: (i) increase global, regional, national, and local institutional support for minimizing threats at World Heritage Sites; (ii) build a culture of disaster prevention at World Heritage Sites using knowledge, innovation, and

education; (iii) identify, assess, and monitor disaster risks; (iv) reduce potential risk, and (v) strengthen disaster preparedness for effective response at all levels [66].

Organizational structures (governance), administrative directives (policy), and operational skills (implementation) are all used in disaster risk management to mitigate the negative consequences of risks and reduce the possibility of a natural disaster [25]. In order to protect people and cultural assets in the face of natural disasters, urban studies advocate resilience as a component of disaster risk management. Therefore, it is necessary to strengthen governance, policy, and implementation frameworks to make cultural landscapes more resilient to natural disasters. At every stage of disaster risk management, from risk assessment to preparation, response, and recovery, the role of each stakeholder should be made clear.

3.3. Understanding the Factors and Challenges Associated with Integrating Cultural Landscape and Resilient Perspectives

Our findings reveal many obstacles to the incorporation of resilience into cultural landscape management. The cultural landscape has only lately been incorporated into the larger worldwide agenda of disaster risk reduction, despite heritage assets increasingly being exposed to natural hazards. The United Nations (UN) established the Strategy for Reducing Disaster Risks at World Heritage Properties in 2007. At the time, attempts were made to apply the Hyogo Protocol's guiding principles to the protection of World Heritage sites. The Sendai Framework for Disaster Risk Reduction 2015–2030, adopted by the UN General Assembly following the UN Third World Conference on Disaster Risk Reduction in 2015, set a new course for disaster risk reduction. The Sendai framework calls for a “substantial reduction of disaster risk and losses in lives, livelihoods, and health and in the economic, physical, social, cultural, and environmental assets of people, businesses, communities, and countries”. The challenges for incorporating cultural landscape management within the Sendai framework are listed below.

The first crucial question is the consequence or purpose of resilience: for what purpose is resilience aimed? In ecological literature, the desired result of resilience is frequently uncritically characterized as sustainability. Defining what is valuable in a historical site is always based on normative judgments. Some features are seen as “natural” or “good”, while others are written off as lacking adaptability or resilience. Reaching a different landscape form may not be considered a sign of resilience if the tangible and intangible characteristics differ from what is considered acceptable. The second challenge is defining a cultural landscape boundary. In a specific socio-ecological system, resilience analysis must ask “resilience of what to what?” It implies that experts will unavoidably focus on certain factors while disregarding others. In the context of cultural heritage, a limited approach quickly results in fragmented practices.

The third issue is to translate resilience from ecology to heritage. Issues such as what is the “desired outcome” and “resilience for whom” are at the core of this discussion. In the ecological literature on resilience, these terms are almost powerless and apolitical, mainly because ecologists frequently believe that “there are no incentives or punishments in nature, just consequences”. This statement may be true; however, in a historic landscape, there are always incentives and consequences: in the process of building resilience, some individuals benefit while others suffer. So, in a sociocultural setting, we cannot judge resilience without looking at questions concerning justice and fairness, in both the way decisions are made and in the way responsibilities and benefits are shared.

According to Fatorić and Seekamp, barriers to cultural resource resilience can be categorized along four dimensions, including (i) institutional, (ii) technical, (iii) financial, and (iv) social barriers, and increasing research on climate adaptation strategies and impacts on cultural heritage characteristics, as well as collaboration among multi-level actors, are among the primary requirements for overcoming these barriers [67]. Other academics argue that policies targeting disaster prevention and preparedness need to be changed to meet the transformation of heritage within the era of climate change [68]. In addition, institutional

issues, such as a lack of cross-sectoral integration, are still problematic. Therefore, teamwork and integration are frequently mentioned as fundamental to successful responses and resilience. Enhancing resilience can be encouraged via multi-sector partnerships, which involve collaboration between various business, governmental and organization actors [68].

Semi-structured interviews conducted by Sesana and colleagues with cultural heritage experts in Europe revealed that collaboration across experts, disciplines, institutions, and nations could help implement better resilient strategies [69]. However, other scholars argue that barriers to resilience in cultural landscape management may be overcome with the right resources (e.g., funds, technology, and know-how) as well as good communication, awareness-raising, and leadership [70,71]. Disasters will not be prevented by risk management that is integrated and iterative. In order to minimize their impact, however, coordinated activities and goals across sectors are essential [72].

Urban governance focuses on the procedures through which government is organized and provided in towns and cities and the connections between state agencies and civil society [73]. Governments have several roles in disaster risk reduction, such as (i) being the supplier of disaster risk reduction goods and services; (ii) supervising private sector activities; (iii) being a proponent of collective action and private-sector involvement; and (iv) coordinating multi-stakeholder initiatives and partnerships for disaster risk reduction. For the process to proceed more smoothly, the government should decentralize its power to encourage everyone to take part in disaster management [74].

The participation of the local community plays an essential role in the integration of resilience into cultural landscape management. Regional planners and site managers can operate more effectively and successfully if they work directly with locals to gain a deeper understanding of the landscape challenges. Citizens' participation in urban decision-making processes has proven to be a valuable tool for better matching population requirements with urban planning models. However, in many circumstances, residents do not engage actively in these planning procedures. The emergence of the sustainable development goals, particularly goal 11 of "Sustainable Cities and Communities", gives urban planners an opportunity to re-evaluate present strategies and tools for achieving more inclusive and participatory procedures [75]. Transparency, dialogue, and collaboration between organizations and the local community also contributes to increasing engagement, allowing activities to develop and flourish. Two major forms of participation in resilient planning are the top-down and bottom-up pathways. Top-down participation seeks to include individuals in projects, mainly during the implementation phase and occasionally during the planning phase. Even when there is public participation, projects are still initiated and ultimately managed by external organizations and professionals; in other cases, community engagement may be limited to particular roles specified by the project's sponsoring agency or professional [76].

Local knowledge and participation are recognized as significant factors in the international guidelines on disaster risk reduction, such as those in the Yokohama, HFA, and Sendai frameworks. This study argues that both the discourse and practice of local community participation in disaster risk reduction need to be reconsidered in order to enhance the resilience of cultural landscapes. Therefore, when a bureaucratic system has been in place for decades and was built to support a sectoral approach, it is extremely difficult to implement a holistic development plan. However, there is an encouraging trend in that many governments have either begun or are in the process of decentralization [77]. By understanding how local populations perceive and respond to threats in cultural landscapes, local governments may employ a bottom-up and participatory approach to develop policy that complements their interventions. To encourage bottom-up participation, it is important to find people in the area who know a lot about the landscape [78].

3.4. *Cinque Terre, an Example of a Cultural Landscape Threatened by Natural Hazard*

Despite its coastal position, the approximately 38 km² Cinque Terre National Park region is predominantly steep and mountainous, with a height of around 800 m above sea

level. This region is characterized by a series of southwest-facing tiny catchments with extremely steep slopes, in some cases restricting the narrow coastal plains and frequently extending directly to the seashore, which is dominated by stony cliffs. This morphological environment facilitates the activation of several geohydrological instabilities, particularly during the regular flash floods that plague the region [79]. The Cinque Terre region was designated a World Heritage site in 1997 and is described as “a cultural landscape of great scenic and cultural value, with the layout and disposition of the small towns and the shaping of the surrounding landscape, overcoming the disadvantages of a steep, uneven terrain, encapsulating the continuous history of human settlement over the past millennium” [80]. Approximately 60 percent of the Cinque Terre landscape is covered by agricultural terraces, which have been built since the Middle Ages and generally consist of dry-stone walls supporting a flat area usually farmed with vineyards and olive trees [81]. The presence of terraced cultivations on steep, seaward-facing slopes is the defining characteristic of the Cinque Terre landscape [82]. A risk assessment of Cinque Terre found that the main threats to the landscape are the abandonment of the terraced landscape and the reforestation that follows [80].

Traditional agriculture used to be a driving force behind the cultural landscape values in central Italy. Cinque Terre’s terraces, created from dry stone and known locally as *Muro a secco*, are still an important aspect of the agricultural system and cultural landscape [83]. The cultivation and maintenance of these terraces requires traditional knowledge, particularly in the fields of hydrology and water management. In the former subsistence system, labor had a different meaning and, above all, a lower cost. Cinque Terre conservation has new obstacles today because of the land ownership and property structure, the fragmentation and the stretches of properties owned by the same farmer, and the price of any maintenance these terraces require [84].

On 25 October 2011, there was an extraordinarily heavy rainfall event in eastern Liguria and northern Tuscany. Numerous landslides, mudflows, and erosions have caused severe damage to the Monterosso and Vernazza basins, which are located in the renowned Cinque Terre region. Most of the damage to buildings and inhabitants was generated due to unstable terraced slopes and a lack of dry-stone wall maintenance (Figure 3). In this way, slope failures had less of an effect on areas with well-kept agricultural terraces. This meant there was less chance of serious damage to human settlements and death.

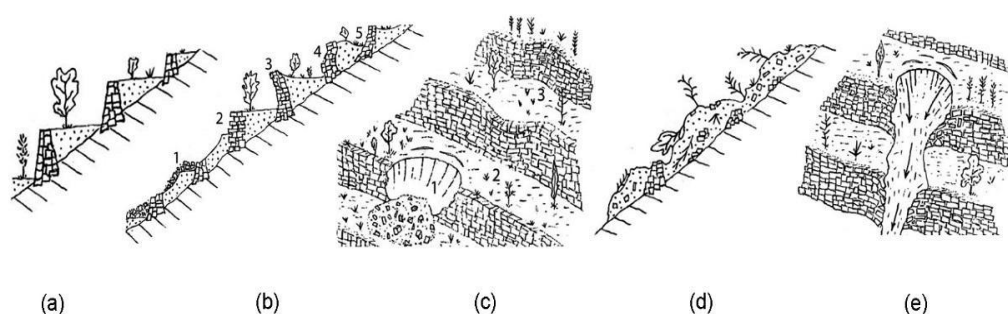


Figure 3. Evolution of slope terracing after farming abandonment: (a) cultivated terraces in good state of conservation; (b) the different forms of dry-stone wall crumbling: falling (1), sliding (2), toppling (3), and bulging and sliding (4, 5); (c) terrace collapse along a concave surface (1), dry-stone wall deformations (2, 3). (d) Dry-stone walls completely destroyed and (e) the terraced slope affected by a shallow landslide [85].

Over the past century, the cultural landscape of Cinque Terre has undergone substantial land-use changes, mostly due to the abandonment of agricultural activity. Several causes, such as erosion and mass migration due to an increase in hydrological risks, contributed to the abandonment process. [82,85]. Furthermore, Italian agriculture has been steadily declining for the past 60 years, with more than 77.4 percent abandonment in the terraced areas of Cinque Terre [35]. To address these issues, farmers and citizens need

increased government support, particularly for interventions linked to hydrogeological risk. Although rural development funds have proven to be effective, and the majority of farmers have applied for them, they are insufficient. For example, even if a farmer restores and maintains his/her dry-stone walls in perfect condition, if the terraces of neighboring properties located upstream are not well maintained, hydrogeological problems persist, and his/her cultivations are put at risk. Farmers believe that they are the only ones now caring for the land, even though this farm management and the repair of dry-stone walls provides positive external and ecosystem services. Landscape management must rely solely on the desire to maintain dry-stone barriers and grow terraces. Farmers, if effectively supported, including through the UNESCO site Management Plan, can offer the most cost-effective and easy means of monitoring and maintaining this region for local authorities [86].

4. Discussion

Our study aimed to investigate how policy recommendations could improve cultural landscape resilience against natural hazards. According to our findings, the general form of the Yokohama, Hyogo, and Sendai frameworks enables their use in a range of geographical contexts, including cultural landscapes. However, very little is mentioned about putting them into practice for this purpose. The Yokohama Strategy and, to a lesser extent, the HFA emphasize the importance of community empowerment and local expertise in reducing disaster risk. Most references to the community in the Sendai framework, on the other hand, consist of vague references to “all levels” of integration, ranging from international to regional. Information or other kinds of outside knowledge, usually based on technology, is given more weight than local knowledge in order to help the most vulnerable communities (e.g., the most exposed, or the poorest communities). Actually, these references serve as a reminder to involve the local community in top-down planning, rather than advocate cross-scale collaboration [8].

With regard to cultural landscapes, resilience is also a practice that focuses on increasing the capacity to deal with natural hazards. However, the resilience framework is not the only way to manage cultural landscapes and enable them to endure pressures, disturbances, and environmental change. Yet the successful implementation of disaster risk reduction strategies and enhancing the resilience of cultural landscapes may benefit from several policy considerations.

At the national level, the first step is to integrate cultural heritage into the national disaster risk reduction plan [87]. For cultural landscapes to remain environmentally, economically, and socially stable, their management must include not just competent stewardship of man-made and natural resources but also political, social, and economic support. Protecting cultural landscapes in the light of natural hazards needs creativity, communication, community participation, cooperation, and funding. Consequently, it is imperative that the national disaster risk reduction plan focuses on cultural landscapes [88].

For disaster risk reduction strategies to be effective, they must encompass all sectors of activity and all levels of government, as stated in the Hyogo Framework for Action (2005–2015). In addition to providing cultural heritage experts with specialized training in disaster risk reduction, planning, and response, the integration of cultural landscapes within the national disaster risk reduction plan facilitates sector interaction, as requested by the HFA. All programs, strategies, and policies related to protecting cultural landscapes from natural hazards must be integrated to achieve a more comprehensive approach to disaster risk reduction and sustainable development. For this purpose, the HFA recommendations are:

- (i) multi-sectoral, which includes the joint efforts of all relevant parties, including public agencies with the expertise for developing and executing strategies to advance all areas of activity, notably culture, emergency preparedness, and land use planning.
- (ii) multi-risk, ensuring that the necessary resources and training are in place to develop and carry out action plans to protect cultural landscapes from a wide range of threats, especially natural disasters.

However, in Latin America and the Caribbean, for instance, the implementation of the Hyogo Framework for Action was hindered by a lack of resources and political support, as well as the inability to secure the participation of other key stakeholders, even though these countries had designed very good disaster risk reduction strategies [89]. Disaster risk reduction of cultural landscapes may be promoted through the use of national platforms. In order to improve collaborations between the cultural heritage sector and national disaster management authorities, workgroups and networks comprised of members from both sectors should be established in order to facilitate the sharing of information and experiences [90].

National or regional reserve funds and effective conservation skills should be more readily available in times of crisis to support the recovery effort. A catalyst for this is agreement-making, which should be established with government officials at all levels to guarantee that emergency response methods and procedures are effective for protecting cultural landscapes. A memorandum of understanding, for example, may be adequate as long as the stakeholders can agree on set objectives, timelines, and desired outcomes. With agreements in place, the disaster risk reduction of cultural landscapes may better handle financial issues and encourage prevention strategies [91,92].

Policy and management strategies for cultural landscapes must be pragmatic rather than just idealistic because cultural heritage is an irreplaceable resource. At all levels of disaster management (assessment, monitoring, risk reduction/response, and recovery/restoration), local community participation is critical for creating practical recommendations and addressing risks. Therefore, successful methods must engage the right people, have adequate resources, and be backed up by a robust mechanism for monitoring, with follow-ups to ensure that they work. Considering that a cultural landscape is defined as “perceived by people”, strengthening local community engagement in the disaster risk reduction process is critical to ensuring its long-term sustainability. This approach is consistent with PA3 and PA5 of the Hyogo framework, which emphasize the role of knowledge, innovation, and education in fostering a safe and resilient culture [4]. To make sure the risk-based decision-making process for a cultural landscape works, it is important to understand, discuss, and use the input of stakeholders [93]. Besides this, education and awareness must be available for all stakeholders surrounding the design, development, and implementation of resilience strategies, as demonstrated by Cinque Terre in Italy. For a participatory planning process in the cultural landscape to work, all stakeholders must agree on measures that are technically, economically, and practically sound as well as being politically and socially acceptable [94].

For the implementation of the Global Standards for Disaster Risk Reduction in cultural landscapes and improving resilience, the active involvement of different sectors, such as governments, civil society, communities, data scientists, and environmental scientists, is essential. However, resilience and its operationalization are sometimes paradoxical due to its diverse origins and methods. This inconsistency occurs because resilience is a cross-disciplinary concept that spans fields such as engineering, ecology, and risk management. Due to disciplinary and conceptual ambiguities, utilizing resilience and integrating it into risk management strategies is likely to be complicated. Therefore, it is vital to develop appropriate indicators in order to objectify resilience in cultural landscapes [95–97]. The example of Cinque Terre illustrates how utilizing traditional knowledge in management practice plays a substantial role in the disaster risk reduction of cultural landscapes. In order to effectively incorporate resilience into cultural landscape management, participatory and collaborative planning approaches are required. Although local community participation is an important component of cultural landscape resiliency, additional efforts are still needed to incorporate the local community into disaster risk management [98].

5. Conclusions

There has been an increase in the frequency and severity of natural disasters due to global warming. As disaster research increases, it is necessary to keep up with current

trends, challenges, and disaster response methods, as well as creative approaches. This study was based on a meta-synthesis of international recommendations on cultural landscapes, resilience, and disaster risk reduction. Its goal was to learn how urban governance and policy can create opportunities for strengthening cultural heritage resilience against natural disasters. Our research examines resilience from a socio-ecological perspective to explain the complex systems of cultural landscapes and their long-term management in the context of natural hazards. The findings indicate that while the Yokohama Strategy places an emphasis on response and recovery, the HFA focuses on preparedness and prevention in its approach to disaster risk management. Both the Yokohama Strategy and the HFA place a value on empowering local communities and utilizing local expertise when attempting to reduce disaster risk. Besides this, the Sendai framework urges regional and international organizations to assist governments and other stakeholders in putting the framework into action by implementing necessary sector policies and standards, monitoring the mechanisms involved, and increasing capacity. However, in order to achieve the objectives of the Sendai framework, more data and information management is needed, as well as community-based activities to improve resilience. On the other hand, none of the three guidelines explains how participants can best help to achieve the suggested goals, nor do they suggest ways to get around the many problems which are bound to arise.

In accordance with the aforementioned guidelines, we contend that planning for disaster risk reduction and cultural heritage management must be integrated at the national level, as disaster risk reduction, risk identification, risk reduction, readiness, financial security, and resilient recovery are the foundations upon which it is built. For cultural landscapes to be more resilient, it is important to set up the right conditions for the right distribution of resources and to set clear roles and responsibilities for everyone involved. The integration of these two processes can help to ensure that the advances made by a cultural landscape are resilient in the face of natural hazards. Damage and loss assessments of cultural landscapes should be developed by governments, as well as by a network of professionals who can be called upon in the event of an emergency. Reports such as this may assist the focus of post-disaster recovery efforts in cultural landscapes for “building back better”.

The findings also reveal that although each country has developed a solid disaster risk reduction policy, these strategies are frequently hampered by a lack of resources and political support, along with a failure to obtain the participation of other essential stakeholders. A systematic disaster risk assessment approach for cultural landscapes exposed to natural hazards has received little discussion, despite various inquiries into risk preparedness and management. Multidisciplinary research must address the delicate historical characteristics, irreplaceable values, and limited risk mitigation and preparedness solutions. Cultural landscapes need a value-based analysis of the linkages among socio-cultural, physical, economic, and environmental risks before a risk assessment can be completed. As a result, it is vital to create collaborations with cultural landscape communities. Adopting a participatory approach in cultural landscape management facilitates the integration process through: the coproduction of knowledge, the retrieval of knowledge, learning through participation, acquiring new inputs, knowledge evaluation, preserving knowledge gains, and legitimizing outcomes. Disaster risk reduction and cultural heritage management are seen as two separate domains, each with its own set of laws and criteria. Due to differences in thought processes, methods of deployment, information sets, spatial focus, and the solutions they develop, each domain is considered to have a different perspective. Therefore, a well-trained working group on natural hazards is needed by the cultural heritage sector to bring the resilience agenda forward. Such a working group should be able to analyze, plan, and coordinate among various government agencies and stakeholders.

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References

1. GEOG 30N. What is a Natural Hazard? GEOG 30N: Environment and Society in a Changing World. Available online: <https://www.e-education.psu.edu/geog30/node/378> (accessed on 4 June 2022).
2. Center for Research on the Epidemiology of Disasters (CRED). Natural Disasters in 2017: Lower Mortality, Higher Cost 2018. Available online: <https://www.google.com.hk/url?sa=t&rct=j&q=&esrc=s&source=web&cd=&cad=rja&uact=8&ved=2ahUKEwiwpp-OwvD4AhVH43MBHQFSaZ8QFnoECAMQAQ&url=https%3A%2F%2Fcred.be%2Fsites%2Fdefault%2Ffiles%2FCredCrunch50.pdf&usg=AOvVaw0V9SWI-XDJGwGvO9pXSYSn> (accessed on 12 March 2022).
3. Nations, U. *Yokohama Strategy and Plan of Action for a Safer World*; United Nations: Geneva, Switzerland, 1994.
4. The United Nations Office for Disaster Risk Reduction (UNDRR). Hyogo Framework for Action 2005–2015: Building the Resilience of Nations and Communities to Disasters-Extract from the final report of the World Conference on Disaster Reduction (A/CONF.206/6). 2005. Available online: <https://www.undrr.org/publication/hyogo-framework-action-2005-2015-building-resilience-nations-and-communities-disasters> (accessed on 12 March 2022).
5. United Nations Office for Disaster Risk Reduction. Sendai framework for disaster risk reduction 2015–2030. In Proceedings of the UN World Conference on Disaster risk Reduction, Sendai, Japan, 14–18 March 2015.
6. Baudoin, M.-A.; Wolde-Georgis, T. Disaster Risk Reduction Efforts in the Greater Horn of Africa. *Int. J. Disaster Risk Sci.* **2015**, *6*, 49–61. [CrossRef]
7. United Nations International Strategy for Disaster Synthesis Report: Consultations on a Post-2015 Framework on Disaster Risk Reduction (HFA2). 2013. Available online: <https://www.undrr.org/publication/synthesis-report-consultations-post-2015-framework-disaster-risk-reduction-hfa2> (accessed on 28 March 2022).
8. Tozier de la Poterie, A.; Baudoin, M.-A. From Yokohama to Sendai: Approaches to Participation in International Disaster Risk Reduction Frameworks. *Int. J. Disaster Risk Sci.* **2015**, *6*, 128–139. [CrossRef]
9. Van Niekerk, D.; Coetzee, C.; Nema-konde, L. Implementing the Sendai Framework in Africa: Progress against the Targets (2015–2018). *Int. J. Disaster Risk Sci.* **2020**, *11*, 179–189. [CrossRef]
10. Nicu, I.C. Natural hazards-a threat for immovable cultural heritage. A review. *Int. J. Conserv. Sci.* **2017**, *8*, 375–388. [CrossRef]
11. Pagliacci, F. Multi-hazard, exposure and vulnerability in Italian municipalities. In *Resilience and Urban Disasters*; Edward Elgar Publishing: Cheltenham, UK, 2019; pp. 175–198, ISBN 978-1-78897-010-5.
12. Ramirez Lopez, L.J.; Grijalba Castro, A.I. Sustainability and Resilience in Smart City Planning: A Review. *Sustainability* **2020**, *13*, 181. [CrossRef]
13. Sharifi, A.; Yamagata, Y. Resilience-Oriented Urban Planning. In *Resilience-Oriented Urban Planning*; Yamagata, Y., Sharifi, A., Eds.; Lecture Notes in Energy; Springer International Publishing: Cham, Switzerland, 2018; Volume 65, pp. 3–27, ISBN 978-3-319-75797-1.
14. World Heritage Centre Convention Concerning the Protection of the World Cultural and Natural Heritage. Available online: <https://whc.unesco.org/en/conventiontext/> (accessed on 17 October 2020).
15. Shirvani Dastgerdi, A.; Sargolini, M.; Broussard Allred, S.; Chatrchyan, A.; De Luca, G. Climate Change and Sustaining Heritage Resources: A Framework for Boosting Cultural and Natural Heritage Conservation in Central Italy. *Climate* **2020**, *8*, 26. [CrossRef]
16. Dastgerdi, A.S.; De Luca, G. Resetting Cultural Heritage Policy and Management Practice—Moderating Mass Tourism in Post-Pandemic Times. *Hist. Environ. Policy Pract.* **2022**, *13*, 28–45. [CrossRef]
17. Molnár, Z.; Berkes, F. Role of traditional ecological knowledge in linking cultural and natural capital in cultural landscapes. In *Reconnecting Natural and Cultural Capital: Contributions from Science and Policy*; Paracchini, M.L., Zingari, P.C., Blasi, C., Eds.; Publications Office of the European Union: Luxembourg, 2018; pp. 183–193.
18. Shirvani Dastgerdi, A.; Sargolini, M.; Pierantoni, I. Climate Change Challenges to Existing Cultural Heritage Policy. *Sustainability* **2019**, *11*, 5227. [CrossRef]
19. Sava, S.; Borca, C.; Clitan, G. (Eds.) Cultural Heritage, Identity and Collective Capacity Building. In *Collective Capacity Building*; BRILL: Leiden, The Netherlands, 2020; pp. 35–43, ISBN 978-90-04-42220-9.
20. Van der Hoeven, A. Valuing Urban Heritage Through Participatory Heritage Websites: Citizen Perceptions of Historic Urban Landscapes. *Space Cult.* **2020**, *23*, 129–148. [CrossRef]
21. Boshier, L.; Kim, D.; Okubo, T.; Chmutina, K.; Jigyasu, R. Dealing with multiple hazards and threats on cultural heritage sites: An assessment of 80 case studies. *Disaster Prev. Manag. Int. J.* **2019**, *29*, 109–128. [CrossRef]
22. Sharifi, A. Resilient urban forms: A macro-scale analysis. *Cities* **2019**, *85*, 1–14. [CrossRef]
23. Büyüközkan, G.; Ilıcak, Ö.; Feyzioğlu, O. A review of urban resilience literature. *Sustain. Cities Soc.* **2022**, *77*, 103579. [CrossRef]

24. Zeng, X.; Yu, Y.; Yang, S.; Lv, Y.; Sarker, M.N.I. Urban Resilience for Urban Sustainability: Concepts, Dimensions, and Perspectives. *Sustainability* **2022**, *14*, 2481. [\[CrossRef\]](#)
25. United Nations International Strategy for Disaster. UNISDR Terminology on Disaster Risk Reduction. Geneva, Switzerland. 2009. Available online: <https://www.undrr.org/publication/2009-unisdr-terminology-disaster-risk-reduction> (accessed on 28 March 2022).
26. Klein, R.J.T.; Nicholls, R.J.; Thomalla, F. Resilience to natural hazards: How useful is this concept? *Environ. Hazards* **2003**, *5*, 35–45. [\[CrossRef\]](#)
27. Norris, F.H.; Stevens, S.P.; Pfefferbaum, B.; Wyche, K.F.; Pfefferbaum, R.L. Community Resilience as a Metaphor, Theory, Set of Capacities, and Strategy for Disaster Readiness. *Am. J. Community Psychol.* **2008**, *41*, 127–150. [\[CrossRef\]](#)
28. Lu, P.; Stead, D. Understanding the notion of resilience in spatial planning: A case study of Rotterdam, The Netherlands. *Cities* **2013**, *35*, 200–212. [\[CrossRef\]](#)
29. Ahern, J. From fail-safe to safe-to-fail: Sustainability and resilience in the new urban world. *Landsc. Urban Plan.* **2011**, *100*, 341–343. [\[CrossRef\]](#)
30. Sharifi, A.; Yamagata, Y. Urban Resilience Assessment: Multiple Dimensions, Criteria, and Indicators. In *Urban Resilience*; Yamagata, Y., Maruyama, H., Eds.; Advanced Sciences and Technologies for Security Applications; Springer International Publishing: Cham, Switzerland, 2016; pp. 259–276, ISBN 978-3-319-39810-5.
31. Bui, H.T.; Jones, T.E.; Weaver, D.B.; Le, A. The adaptive resilience of living cultural heritage in a tourism destination. *J. Sustain. Tour.* **2020**, *28*, 1022–1040. [\[CrossRef\]](#)
32. Vert, M.; Sharpanskykh, A.; Curran, R. Adaptive Resilience of Complex Safety-Critical Sociotechnical Systems: Toward a Unified Conceptual Framework and Its Formalization. *Sustainability* **2021**, *13*, 13915. [\[CrossRef\]](#)
33. UNISDR. Making Disaster Risk Reduction Gender Sensitive: Policy and Practical Guidelines. 2009. Available online: https://www.unisdr.org/files/9922_MakingDisasterRiskReductionGenderSe.pdf (accessed on 28 March 2022).
34. Pelling, M.; Manuel-Navarrete, D. From resilience to transformation: The adaptive cycle in two Mexican urban centers. *Ecol. Soc.* **2011**, *16*, 11. Available online: <https://www.ecologyandsociety.org/vol16/iss2/art11/> (accessed on 28 March 2022). [\[CrossRef\]](#)
35. Serre, D.; Heinzlef, C. Assessing and mapping urban resilience to floods with respect to cascading effects through critical infrastructure networks. *Int. J. Disaster Risk Reduct.* **2018**, *30*, 235–243. [\[CrossRef\]](#)
36. Walker, B.; Holling, C.S.; Carpenter, S.R.; Kinzig, A. Resilience, adaptability and transformability in social–ecological systems. *Ecol. Soc.* **2004**, *9*, 5. Available online: <https://www.ecologyandsociety.org/vol9/iss2/art5/> (accessed on 28 March 2022). [\[CrossRef\]](#)
37. Walker, B.; Salt, D. *Resilience Practice: Building Capacity to Absorb Disturbance and Maintain Function*; SpringerLink; Island Press: Washington, DC, USA, 2012; ISBN 978-1-61091-231-0.
38. Gunderson, L. Panarchy. In *Encyclopedia of Ecology*; Elsevier: Amsterdam, The Netherlands, 2008; pp. 2634–2638, ISBN 978-0-08-045405-4.
39. Meerow, S.; Newell, J.P.; Stults, M. Defining urban resilience: A review. *Landsc. Urban Plan.* **2016**, *147*, 38–49. [\[CrossRef\]](#)
40. Sterk, M.; van de Leemput, I.A.; Peeters, E.T. How to conceptualize and operationalize resilience in socio-ecological systems? *Curr. Opin. Environ. Sustain.* **2017**, *28*, 108–113. [\[CrossRef\]](#)
41. Mngumi, L.E. Socio-ecological resilience to climate change effects in peri-urban areas: Insights from the Pugu and Kazimzumbwi forest reserves of Dar es Salaam, Tanzania. *Geojournal* **2021**, *86*, 339–355. [\[CrossRef\]](#)
42. Folke, C.; Carpenter, S.R.; Walker, B.; Scheffer, M.; Chapin, T.; Rockström, J. Resilience thinking: Integrating resilience, adaptability and transformability. *Ecol. Soc.* **2010**, *15*, 20. Available online: <https://www.ecologyandsociety.org/vol15/iss4/art20/> (accessed on 28 March 2022). [\[CrossRef\]](#)
43. Holling, C.S. Understanding the complexity of economic, ecological, and social systems. *Ecosystems* **2001**, *4*, 390–405. [\[CrossRef\]](#)
44. Seekamp, E.; Jo, E. Resilience and transformation of heritage sites to accommodate for loss and learning in a changing climate. *Clim. Chang.* **2020**, *162*, 41–55. [\[CrossRef\]](#)
45. Davoudi, S.; Shaw, K.; Haider, L.J.; Quinlan, A.E.; Peterson, G.D.; Wilkinson, C.; Fünfgeld, H.; McEvoy, D.; Porter, L.; Davoudi, S. Resilience: A Bridging Concept or a Dead End? “Reframing” Resilience: Challenges for Planning Theory and Practice Interacting Traps: Resilience Assessment of a Pasture Management System in Northern Afghanistan Urban Resilience: What Does it Mean in Planning Practice? Resilience as a Useful Concept for Climate Change Adaptation? The Politics of Resilience for Planning: A Cautionary Note: Edited by Simin Davoudi and Libby Porter. *Plan. Theory Pract.* **2012**, *13*, 299–333. [\[CrossRef\]](#)
46. Fedele, G.; Donatti, C.I.; Harvey, C.A.; Hannah, L.; Hole, D.G. Transformative adaptation to climate change for sustainable social-ecological systems. *Environ. Sci. Policy* **2019**, *101*, 116–125. [\[CrossRef\]](#)
47. Hofmann, S.Z. 100 Resilient Cities program and the role of the Sendai framework and disaster risk reduction for resilient cities. *Prog. Disaster Sci.* **2021**, *11*, 100189. [\[CrossRef\]](#)
48. Walker, B.; Carpenter, S.R.; Anderies, J.M.; Abel, N.; Cumming, G.; Janssen, M.A.; Lebel, L.; Norberg, J.; Peterson, G.D.; Pritchard, R. Resilience Management in Social-ecological Systems: A Working Hypothesis for a Participatory Approach. *Conserv. Ecol.* **2002**, *6*, art14. [\[CrossRef\]](#)
49. Ramasubramanian, L.; Menser, M.; Rieser, E.; Feder, L.; Forrester, R.; Leichenko, R.; Allred, S.; Ferenz, G.; Brezin, M.; Bolstad, J.; et al. Strategies for Community Resilience Practice for the Jamaica Bay Watershed. In *Prospects for Resilience: Insights from New York City's Jamaica Bay*; Sanderson, E.W., Solecki, W.D., Waldman, J.R., Parris, A.S., Eds.; Island Press/Center for Resource Economics: Washington, DC, USA, 2016; pp. 241–252, ISBN 978-1-61091-734-6.
50. Meerow, S.; Newell, J.P. Urban resilience for whom, what, when, where, and why? *Urban Geogr.* **2019**, *40*, 309–329. [\[CrossRef\]](#)

51. Allred, S.; DuBois, B.; Bunting-Howarth, K.; Tidball, K.; Solecki, W.D. Social-Ecological System Transformation in Jamaica Bay. In *Prospects for Resilience: Insights from New York City's Jamaica Bay*; Sanderson, E.W., Solecki, W.D., Waldman, J.R., Parris, A.S., Eds.; Island Press/Center for Resource Economics: Washington, DC, USA, 2016; pp. 43–62, ISBN 978-1-61091-734-6.
52. Walker, B.; Salt, D.; Reid, W. *Resilience Thinking: Sustaining Ecosystems and People in A Changing World*; Bibliovault OAI Repository, The University of Chicago Press: Washington, DC, USA, 2006.
53. Potthoff, K. The use of 'cultural landscape' in 19th century German geographical literature. *Nor. Geogr. Tidsskr. Nor. J. Geogr.* **2013**, *67*, 49–54. [\[CrossRef\]](#)
54. Sauer, C.O. The morphology of landscape. *Found. Pap. Landsc. Ecol.* **2007**, *2*, 36–70.
55. Brumann, C.; Gfeller, A.É. Cultural landscapes and the UNESCO World Heritage List: Perpetuating European dominance. *Int. J. Herit. Stud.* **2022**, *28*, 147–162. [\[CrossRef\]](#)
56. World Heritage Centre. The Operational Guidelines for the Implementation of the World Heritage Convention. 2019. Available online: https://www.google.com.hk/url?sa=t&rct=j&q=&esrc=s&source=web&cd=&cad=rja&uact=8&ved=2ahUKEwjI4pX3w_D4AhVhI0QIHbrCCnQQFnoECAGQAQ&url=https%3A%2F%2Fwhc.unesco.org%2Fdocument%2F178167&usg=AOvVaw3RJKg-v6ujlpA48vUhEvw2 (accessed on 10 July 2019).
57. Sodano, C. Cultural Landscapes in International Charters. *Mus. Int.* **2017**, *69*, 82–85. [\[CrossRef\]](#)
58. Council of Europe European Landscape Convention. 2000. Available online: <https://www.coe.int/en/web/landscape/the-european-landscape-convention> (accessed on 18 January 2022).
59. Schmitz, M.F.; Herrero-Jáuregui, C. Cultural Landscape Preservation and Social–Ecological Sustainability. *Sustainability* **2021**, *13*, 2593. [\[CrossRef\]](#)
60. Sargolini, M. *Urban Landscapes*; Springer: Milan, Italy, 2013.
61. Kirchhoff, T.; Brand, F.S.; Hoheisel, D. From cultural landscapes to resilient social–ecological systems: Transformation of a classical paradigm or a novel approach? In *Resilience and the Cultural Landscape*; Plieninger, T., Bieling, C., Eds.; Cambridge University Press: Cambridge, UK, 2012; pp. 49–64, ISBN 978-1-139-10777-8.
62. Selman, P. Landscapes as integrating frameworks for human, environmental and policy processes. In *Resilience and the Cultural Landscape*; Plieninger, T., Bieling, C., Eds.; Cambridge University Press: Cambridge, UK, 2012; pp. 27–48, ISBN 978-1-139-10777-8.
63. Berkes, F.; Colding, J.; Folke, C. *Navigating Social-Ecological Systems: Building Resilience for Complexity and Change*; Cambridge University Press: Cambridge, UK, 2008.
64. Ostrom, E. A General Framework for Analyzing Sustainability of Social-Ecological Systems. *Science* **2009**, *325*, 419–422. [\[CrossRef\]](#)
65. Andrea, C. *La Protezione Internazionale ed Europea dei Beni Culturali*; Cacucci Editore Sas: Bari, Italy, 2014; Volume 9.
66. UNESCO. World Heritage Centre Reducing Disasters Risks at World Heritage Properties. Available online: <https://whc.unesco.org/en/disaster-risk-reduction/> (accessed on 23 September 2021).
67. Fatorić, S.; Seekamp, E. Securing the Future of Cultural Heritage by Identifying Barriers to and Strategizing Solutions for Preservation under Changing Climate Conditions. *Sustainability* **2017**, *9*, 2143. [\[CrossRef\]](#)
68. Porrini, D.; De Masi, F. Managing climate change risk: The case of the Italian Churches. *Nat. Hazards* **2021**, *105*, 2619–2637. [\[CrossRef\]](#)
69. Sesana, E.; Gagnon, A.; Bertolin, C.; Hughes, J. Adapting Cultural Heritage to Climate Change Risks: Perspectives of Cultural Heritage Experts in Europe. *Geosciences* **2018**, *8*, 305. [\[CrossRef\]](#)
70. Mizutori, M. From risk to resilience: Pathways for sustainable development. *Prog. Disaster Sci.* **2019**, *2*, 100011. [\[CrossRef\]](#)
71. Holtorf, C. Embracing change: How cultural resilience is increased through cultural heritage. *World Archaeol.* **2018**, *50*, 639–650. [\[CrossRef\]](#)
72. Santangelo, A.; Melandri, E.; Marzani, G.; Tondelli, S.; Ugolini, A. Enhancing Resilience of Cultural Heritage in Historical Areas: A Collection of Good Practices. *Sustainability* **2022**, *14*, 5171. [\[CrossRef\]](#)
73. Urban Governance—An overview. ScienceDirect Topics. Available online: <https://www.sciencedirect.com/topics/social-sciences/urban-governance> (accessed on 11 June 2022).
74. Kong, F.; Sun, S. Understanding the Government Responsibility and Role of Enterprises' Participation in Disaster Management in China. *Sustainability* **2021**, *13*, 1708. [\[CrossRef\]](#)
75. Martí, P.; Pérez del Hoyo, R.; Nolasco-Cirugeda, A.; Serrano-Estrada, L.; García-Mayor, C. The potential of location-based social networks for participatory urban planning. In *Smart Cities and the un SDGs*; Elsevier: Amsterdam, The Netherlands, 2021; pp. 107–123, ISBN 978-0-323-85151-0.
76. Van Meerkerk, I. Top-down versus bottom-up pathways to collaboration between governments and citizens: Reflecting on different participation traps. In *Collaboration in Public Service Delivery*; Edward Elgar Publishing: Cheltenham, UK, 2019.
77. Witoelar, E. People-centred cities in a globalizing world: Issues in governance. *Transp. Commun. Bull. Asia Pac.* **2001**, *71*, 1–8.
78. Butler, J.R.A.; Wise, R.M.; Skewes, T.D.; Bohensky, E.L.; Peterson, N.; Suadnya, W.; Yanuartati, Y.; Handayani, T.; Habibi, P.; Puspadi, K.; et al. Integrating Top-Down and Bottom-Up Adaptation Planning to Build Adaptive Capacity: A Structured Learning Approach. *Coast. Manag.* **2015**, *43*, 346–364. [\[CrossRef\]](#)
79. Raso, E.; Cevasco, A.; Di Martire, D.; Pepe, G.; Scarpellini, P.; Calcaterra, D.; Firpo, M. Landslide-inventory of the Cinque Terre National Park (Italy) and quantitative interaction with the trail network. *J. Maps* **2019**, *15*, 818–830. [\[CrossRef\]](#)

80. World Heritage Committee. Icomos Joint Advisory Mission To The World Heritage Property: Portovenere, Cinque Terre, and the Islands (Palmaria, Tino and Tinetto) Italy—World Heritage Committee, Thirty-seventh session; 2012. Available online: <https://whc.unesco.org/en/list/826/> (accessed on 9 May 2022).
81. Trevisani, S.; Cavalli, M.; Marchi, L. Surface texture analysis of a high-resolution DTM: Interpreting an alpine basin. *Geomorphology* **2012**, *161*–162, 26–39. [[CrossRef](#)]
82. Agnoletti, M.; Errico, A.; Santoro, A.; Dani, A.; Preti, F. Terraced Landscapes and Hydrogeological Risk. Effects of Land Abandonment in Cinque Terre (Italy) during Severe Rainfall Events. *Sustainability* **2019**, *11*, 235. [[CrossRef](#)]
83. Borselli, L.; Petri, P. Muri A Secco: Verifiche Di Stabilit  con Software Ssap 5.0 E Criterio Ghb (Gsi) Per Le Strutture in Roccia. *Method* **2020**, *2*, 22–52.
84. Dorato, E. resilience and cultural landscapes: The Cinque Terre Natonal Park case study. *Converg. J. Res. Arts Educ.* **2021**, *13*, 13–21. [[CrossRef](#)]
85. Brandolini, P. The Outstanding Terraced Landscape of the Cinque Terre Coastal Slopes (Eastern Liguria). In *Landscapes and Landforms of Italy*; Soldati, M., Marchetti, M., Eds.; Springer International Publishing: Cham, Switzerland, 2017; pp. 235–244, ISBN 978-3-319-26194-2.
86. Santoro, A.; Venturi, M.; Agnoletti, M. Landscape Perception and Public Participation for the Conservation and Valorization of Cultural Landscapes: The Case of the Cinque Terre and Porto Venere UNESCO Site. *Land* **2021**, *10*, 93. [[CrossRef](#)]
87. Disaster Risk Management for Cultural Heritage. Available online: <https://www.icrom.org/section/disaster-resilient-heritage/> (accessed on 29 June 2022).
88. Beagan, C.; Dolan, S. Integrating Components of Resilient Systems into Cultural Landscape Management Practices. *Chang. Time* **2015**, *5*, 180–199. [[CrossRef](#)]
89. Bello, O.; Bustamante, A.; Pizarro, P. Planning for Disaster Risk Reduction within the Framework of the 2030 Agenda for Sustainable Development; 2021. Available online: https://repositorio.cepal.org/bitstream/handle/11362/46639/1/S2000452_en.pdf (accessed on 29 June 2022).
90. Jigyasu, R.; Murthy, M.; Boccardi, G.; Marrion, C.; Douglas, D.; King, J.; O'Brien, G.; Dolcemasclo, G.; Kim, Y.; Albrito, P.; et al. Heritage and Resilience: Issues and Opportunities for Reducing Disaster Risks. 2013. Available online: https://www.researchgate.net/publication/327906144_HERITAGE_AND_RESILIENCE_Issues_and_Opportunities_for_Reducing_Disaster_Risks (accessed on 29 June 2022).
91. Florentin, K.M.; Onuki, M.; Esteban, M.; Valenzuela, V.P.; Paterno, M.C.; Akpedonu, E.; Arcilla, J.; Garciano, L. Implementing a Pre-disaster Recovery Workshop in Intramuros, Manila, Philippines: Lessons for disaster risk assessment, response, and recovery for cultural heritage. *Disasters* **2022**, *46*, 791–813. [[CrossRef](#)]
92. Giustiniani, F.Z. International Cultural Heritage Law (2018). *Yearb. Int. Disaster Law* **2019**, *1*, 419–425. [[CrossRef](#)]
93. Michalski, S.; Pedersoli Jr, J.L. The ABC method: A risk management approach to the preservation of CH. 2016, pp. 27–32. Available online: <https://www.preventionweb.net/publication/abc-method-risk-management-approach-preservation-cultural-heritage> (accessed on 29 June 2022).
94. Hardoy, J.; Gencer, E.; Winograd, M. Participatory planning for climate resilient and inclusive urban development in Dosquebradas, Santa Ana and Santa Tom . *Environ. Urban.* **2019**, *31*, 33–52. [[CrossRef](#)]
95. Reghezza-Zitt, M.; Rufat, S.; Djament-Tran, G.; Le Blanc, A.; Lhomme, S. What Resilience Is Not: Uses and Abuses. *Cybergeog* **2012**. [[CrossRef](#)]
96. Kheyroddin, R.; Abbaspour kalmarzi, M. Ecological Tourism Development Model of Impassable Mountainous Areas in the Context of the Ancient Infrastructure of the Railway Network (Case study: Tehran-Mazandaran railway). *Q. J. Urban Reg. Dev. Plan.* **2019**, *4*, 1–36. [[CrossRef](#)]
97. Kheyroddin, R.; Rahsaz, S.; Abbaspour Kalmarzi, M. Ecological Tourism Development in the Mountainous Regions and Historical Railway Network Capacities. Case Study: Tehran-Mazandaran Old Railway by Crossing the Alborz Mountain Range. *Lucr. Semin. Geogr. Dimitrie Cantemir* **2020**, *48*, 186–206. [[CrossRef](#)]
98. Mutiarni, Y.S.; Nakamura, H.; Bhattacharya, Y. The Resilient Community: Strengthening People-Centered Disaster Risk Reduction in the Merapi Volcano Community, Java, Indonesia. *Sustainability* **2022**, *14*, 2215. [[CrossRef](#)]