sustainability

MDPI

Article

Cultural Landscapes under the Threat of Climate Change: A Systematic Study of Barriers to Resilience

Gül Aktürk [1,*] and Ahmadreza Shirvani Dastgerdi [2,3]

[1] Faculty of Architecture and the Built Environment, Delft University of Technology (T.U. Delft), 2628 BL Delft, The Netherlands
[2] Department of Natural Resources and the Environment, Cornell University, 226 Mann Dr, Ithaca, NY 14853, USA; as4257@cornell.edu or ahmadreza.shirvani@unicam.it
[3] School of Architecture and Design, University of Camerino, Viale delle Rimembranze, 63100 Ascoli Piceno, Italy
* Correspondence: g.akturk@tudelft.nl; Tel.: +31-0617-285-407

Abstract: Cultural landscapes reflect a cultural group's continuous and evolved interactions with natural resources and the environment. By now, climate change has become the most significant threat to cultural landscapes, e.g., food security, water scarcity, and displacement. The cultural and natural heritage of cultural landscapes can enhance their value as integrated systems and offer solutions to the challenges brought by climate change. Although exploring tangible impacts of climate change has received sufficient attention in cultural landscapes, a systematic understanding of the main barriers has been overlooked in building climate resilience in cultural landscapes. This paper aimed to explore the main barriers to building climate resilience in cultural landscapes. The research methodology was based on the content analysis of 359 documents published between 1995 and 2020. The results revealed that the integrated approach in documentation and assessments was the most quoted technical barrier. In addition, the lack of a regulatory framework for supporting effective collaboration and cooperation has been discussed as the most significant institutional obstacle to climate resilience in cultural landscapes.

Keywords: cultural landscape; climate resilience; barriers; climate change; cultural heritage

check for updates

Citation: Aktürk, G.; Dastgerdi, A.S. Cultural Landscapes under the Threat of Climate Change: A Systematic Study of Barriers to Resilience. *Sustainability* **2021**, *13*, 9974. https://doi.org/10.3390/su13179974

Academic Editor: Alejandro Rescia

Received: 18 July 2021
Accepted: 3 September 2021
Published: 6 September 2021

Publisher's Note: MDPI stays neutral with regard to jurisdictional claims in published maps and institutional affiliations.

Copyright: © 2021 by the authors. Licensee MDPI, Basel, Switzerland. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license (https://creativecommons.org/licenses/by/4.0/).

1. Introduction

The concept of cultural landscapes exhibits the dynamic and interwoven relationship between society, environment, and culture [1]. It covers a broad spectrum of interactions, synergies, and processes of multiple spatial and temporal scales and is thus an interdisciplinary term by nature [2]. Cultural landscapes are the result of social-ecological processes [3,4] and is, thus, constantly modified, altered, evolved, cultivated, and enhanced [5]. Emphasizing the linkages of human society and nature, both concepts of cultural landscapes and social-ecological systems form a cultural ecosystem [6]. In this respect, the social-ecological systems concept engages with the notion of resilience more closely (with its characteristics of scale, uncertainty, nonlinearity, and self-organization or adaptability) in the way it deals with complexity and change [7,8]. Social-ecological system theories recognize nature and societies as inextricably interdependent, integrated, and nested systems, a view that we adopt to better understand cultural landscapes.

Cultural landscapes form an exceptional status in the conservation of cultural heritage by building the bridge between culture and nature. Furthermore, cultural landscapes—both tangible and intangible heritage, biological, and cultural diversity—are examples of collective identities, cultures, and works of people, according to Rössler [9].

The concept of cultural landscapes has been widely defined and discussed by many different disciplines and fields. The United Nations Educational, Scientific, and Cultural Organization (UNESCO) World Heritage Convention in 1992 recognized and protected the

"cultural landscape" as the "combined works of nature and of man" with its "outstanding universal value [10]." Actions and policies have been undertaken by the World Heritage Committee and its advisory bodies (including ICCROM, the International Centre for the Study of the Preservation and Restoration of Cultural Property; ICOMOS, the International Council on Monuments and Sites; and IUCN, the International Union for Conservation of Nature) individually or collaboratively [11].

This was a defining moment for the concept of the cultural landscape to be incorporated into heritage regulations and practice [12]. In this perspective, cultural landscapes acquire a territorial view on the appreciation of cultural and natural heritage and the relationships and processes between them, as well as their surroundings [13]. Hence, the reading and interpretation of cultural landscapes stimulated progressive and innovative discussions in the field by proposing that heritage places are not isolated and they should be evaluated in their context with their attachment to landscapes and people [14].

However, UNESCO's reactive vision to the conservation and management of cultural landscapes has been criticized from the points of view of territorial planning [15]. In this respect, the European Landscape Convention embraces a more proactive and forward-looking approach in planning and integrating the landscape into regional and town planning with its essential components of cultural and natural heritage resources [16]. Looking ahead, the Europe Landscape Convention promotes the development of a more dynamic and adaptative approach in the management of landscapes against unforeseen events rather than simply conserving them [12]. For achieving a broader view, cultural landscapes may include, but are not limited to, districts recognized and/or designated as heritage resources. This vision acknowledges the values of heritage components of a particular landscape as a keystone in its sustainable development and management.

Managing these complex systems has become challenging due to the adverse effects of climate change. Cultural landscapes evolved in a certain climate, and now climate change is impacting and transforming them [17–19]. Cultural landscapes are not only vulnerable to the direct impacts of climate change, e.g., degradation of biodiversity and ecosystems, water scarcity, and erosion of lands, but also to the indirect consequences [20], including the loss of agricultural activities, displacement [17], loss of intangible values [21,22], and decrease in the number of visitors [23]. Although the impacts of climate change have been recognized as a threat to cultural heritage by academics [24–28], the extent and scale of specific challenges of climate change on cultural landscapes have yet to be discovered.

In the context of this paper, cultural landscapes are hereby comprehended and referred to as social-ecological systems in which the cultural and natural heritage resources hold significant knowledge for tackling climate change. Cultural landscapes with traces of cultural and/or natural heritage testify the living and transforming traditional cultures integral to the understanding of the human response to changing environmental and climatic conditions [29,30]. Therefore, as an integral part of territorial and spatial planning and policies, cultural landscapes should be planned, managed, and protected by recognizing cultural and natural heritage resources [31].

As the impacts of climate change accelerate with increasing speed, there is a growing need for building climate resilience in cultural landscapes. Here, we used the term of resilience as "the ability of a social or ecological system to absorb disturbances while retaining the same basic structure and ways of functioning, the capacity for self-organization and the capacity to adapt to stress and change [32]." Climate change adaptation requires efforts in reducing vulnerability or building resilience as a response to the impacts of climate change [33]. Improving the resilience of cultural landscapes can contribute to climate adaptation. Climate resilience ensures better planning and preparation for the acute and slow-onset risk of climate change.

However, few studies have addressed climate resilience in cultural landscapes [34,35]. Moreover, the monitoring of cultural landscapes as a "whole" with its past stories, ongoing climate change, and human activities has not been adequate to plan for climate adaptation [36]. Thus, there is an urgent need for a systematic understanding of climate change impacts and the main barriers to climate-resilient cultural landscapes [35].

The identification and understanding of barriers, constraints, and limits to climate change adaptation are significant for decision- and policy-makers to overcome them [37,38]. There has been an overwhelming amount of systematic literature reviews on analyzing the reported barriers in climate adaptation [39–43]. Particularly, a few reviewed studies have explored financial barriers in the preservation and adaptation of cultural heritage [26,44]. In the case of the Netherlands, the results from a web-based questionnaire revealed that "there is a lack of climate change adaptation policy for cultural heritage and a lack of climate vulnerability and risk assessments for diverse heritage types" [45]. Similarly, a recent systematic work of publications from 2016 to 2020 suggested that the technical barriers were mentioned most, while there is a need for collaboration and cooperation to improve the response to climate change in the context of cultural heritage [25]. Although cultural landscapes have been included in these systematic literature reviews, the main barriers and their interrelations have not yet been adequately addressed in the focus of cultural landscapes.

By adopting this method, it provides a better understanding of what needs to be provided and prioritized for climate resilience [46], and consequently, the protection of socio-economic dynamics in cultural landscapes. This paper, therefore, aimed to identify and analyze the barriers in building climate resilience in cultural landscapes through a systematic literature review.

2. Methodology

This study adopted content analysis as the research methodology that includes the three steps of (1) coding, (2) categorizing, and (3) development of themes [47]. First, a systematic literature review was undertaken to identify, critically analyze, and integrate the findings of relevant publications by addressing one or more research questions [48].

Initially, the characteristics of the selected publications were grouped based on the four aspects: (1) the number and type of publication (i.e., article, report, and book chapter) by year, (2) the name of the publication source, (3) the geographical location of the selected cases in the publications. This provides the identification of characteristics of the extent and nature of the existing literature [49].

It then focused on the main barriers by asking the question of (4) what the barriers and knowledge gaps of climate resilience are. We examined empirical studies, which analyzed cultural landscapes under the threat of climate change in diverse themes of sustainability, climate mitigation, resilience, and adaptation. The barriers to climate resilience in cultural landscapes have not yet been studied, as mentioned before. Thus, the reviewed publications did not specifically analyze the barriers to climate resilience in cultural landscapes. Given their wide range of focus, we evaluated the interface between the barriers and climate resilience of cultural landscapes.

In the identification of the barriers, the quotes were extracted mainly from the results and discussions sections. The keywords of "barriers," "challenges," "concern," "constraints," "limits," "lack," "need," "must," and "should" were searched for the initial analysis. The main barriers were categorized as technical, institutional, financial, and socio-cultural derived from the literature [44,45]. The results of the first three questions are given in the analysis section, while the main obstacles and their relations are explained further in the discussions section.

Sampling

The publications on cultural landscapes under the changing climate, which were published between 1995 and 2020, were examined by using content analysis. The key terms included a combination of the two keywords: "cultural landscape*" and "climate change" to select the most relevant publications by purposive sampling. These keywords were searched using the internationally recognized electronic scientific database Web of Science Core Collection and Scopus in June 2020.

The search query initially retained a total number of 359 documents with the retrieval of 194 publications from the Web of Science and 165 from Scopus. At the screening phase, 88 papers were eliminated due to the duplicates from the initial review of these two databases. It yielded a preliminary list of 271 relevant publications, which were downloaded and screened according to eligibility criteria.

The inclusion criteria for these 271 publications consisted of: (a) book chapters, journals, and conference proceedings, (b) publications in English, and (c) a strong emphasis on the cultural landscapes and climate change (keywords of cultural landscape and climate change) in the topic of field literature. The publications that do not fit into these three criteria were discarded. A number of 53 documents were identified as the first exclusion criterion on document type, e.g., conference reviews, reviews, letters, commentary, concept paper, abstract, book, perspective, and editorial materials. Furthermore, a list of 24 publications, which were written in foreign languages, were removed. For the scope of this review, 68 publications, which do not mention cultural landscapes and/or climate change, were also filtered. The process of the selection of publications for this systematic literature review is explained in Figure 1.

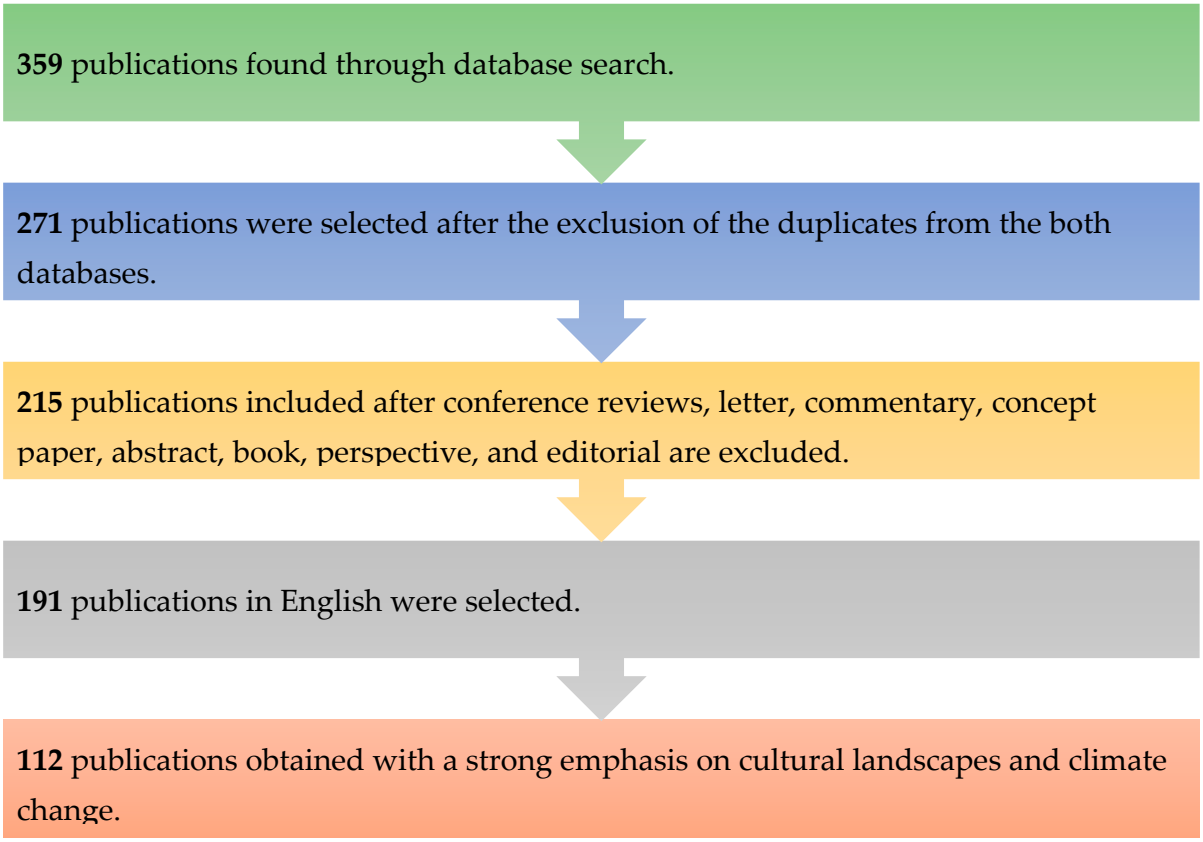

Figure 1. The flow diagram of the selection process of publications included in the systematic literature review with the eligibility criteria.

The study did not include publications in foreign languages, due to the issues associated with the translation. It also excluded reports, projects, white papers, and policy documents because they are not peer-reviewed as academic literature [25]. As a result, a total of 112 publications were included in the final analysis following an extensive process of searching, screening, and application of exclusion and inclusion criteria.

3. Analysis

There has been a growing body of research on the cultural landscapes under a changing climate with various publications over the past twelve years (Figure 2). The majority of the publications are classified as articles (n = 88. 79%), while book chapters (n = 14. 13%), proceedings (n = 7. 6%), and reports (n = 3. 3%) are the less common type of publications. Among these publications, the number of articles and book chapters sharply quadrupled between 2008 and 2018, whereas the number of proceedings and reports has not exceeded the number of two. The overall number of publications has decreased in the last two years.

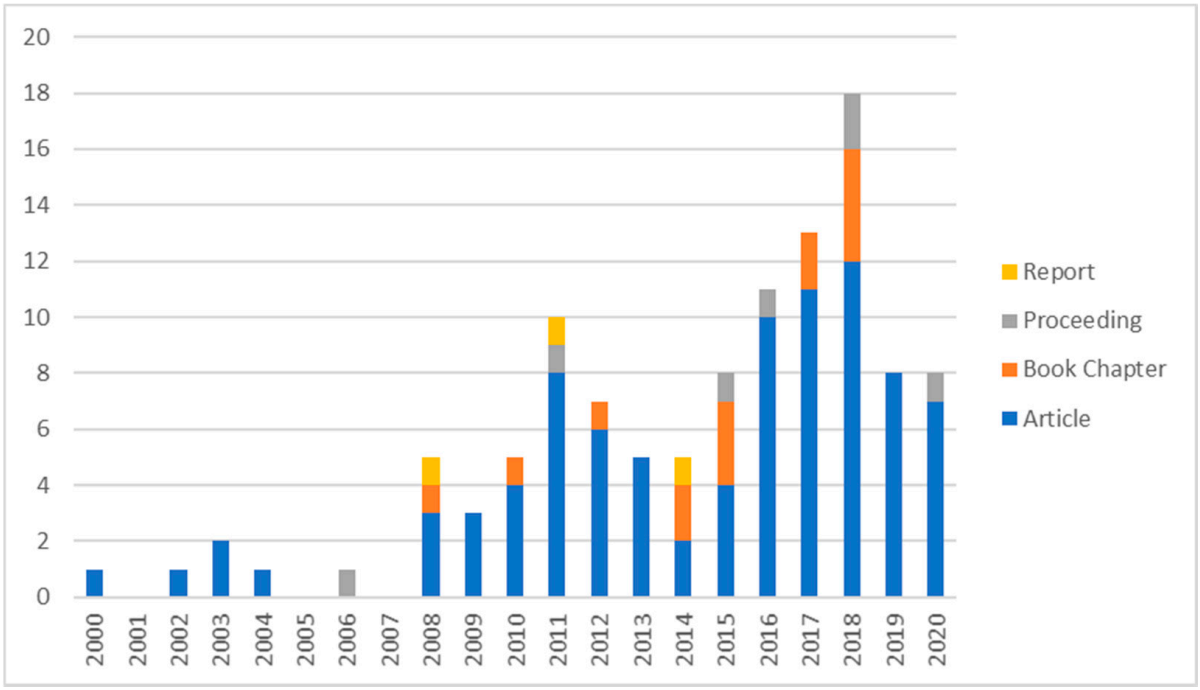

Figure 2. The number and types of publications per year.

The distribution of the number of a wide range of publication sources reflects the theme's diverse interest. Identifying the publications varying across disciplines revealed the inter-, multi-, and transdisciplinary theme of cultural landscapes under the threat of climate change (Figure 3). The reviewed publications include different temporalities (past and present) of the effects of climate change on cultural landscapes. The archaeological journals frequently appear regarding the past temporality, e.g., Holocene (n = 4. 4%) and Quaternary Science Reviews (n = 4. 4%). Equally, Landscape Ecology (n = 4. 4%) has dominated the studies regarding the present temporality.

The risk of climate change on cultural landscapes has attracted the attention of diverse researchers globally (Figure 4). The selected publications focused mainly on a single case study, whereas a few publications (n = 12) presented multiple case studies. Some of these publications referred to the cases of continents such as Africa; thus, they referred to African countries. The results of the geographical distribution revealed that most of the case studies were conducted in the United States of America (n = 14). Next, the United Kingdom and Italy (n = 9) were the most studied countries. Although U.S. and European countries dominated the topic, China (n = 7) and African countries (n = 6) were

investigated further. It was observed that there was an overwhelming number of cases from the European countries, for example, Cyprus, the Czech Republic (n = 4), and Germany (n = 3). Meanwhile, the least number of studied cases were dedicated to developing countries such as Cambodia and Mongolia (n = 1).

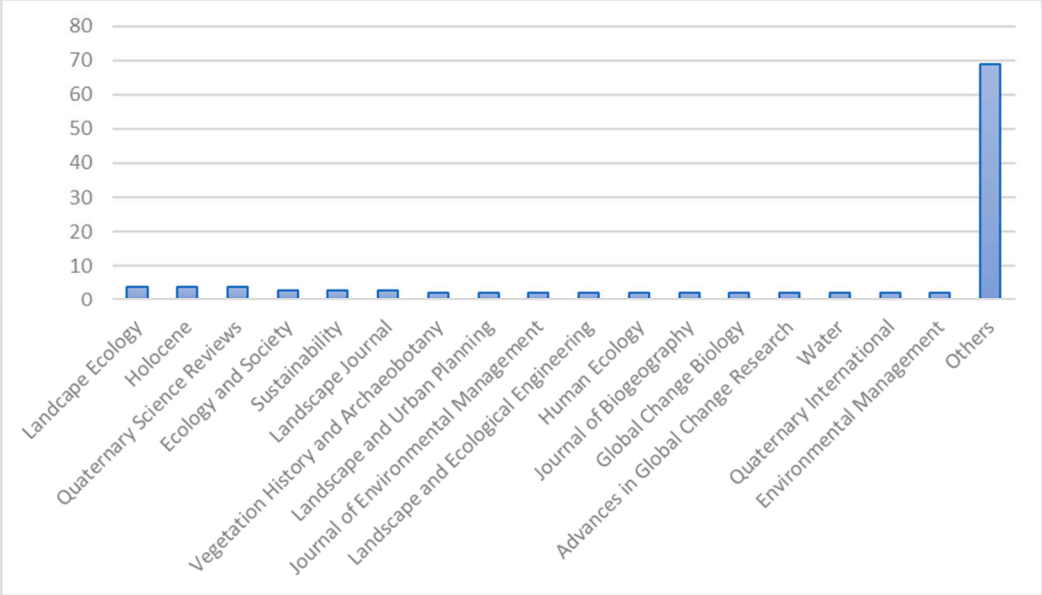

Figure 3. The number and title of the sources of publications.

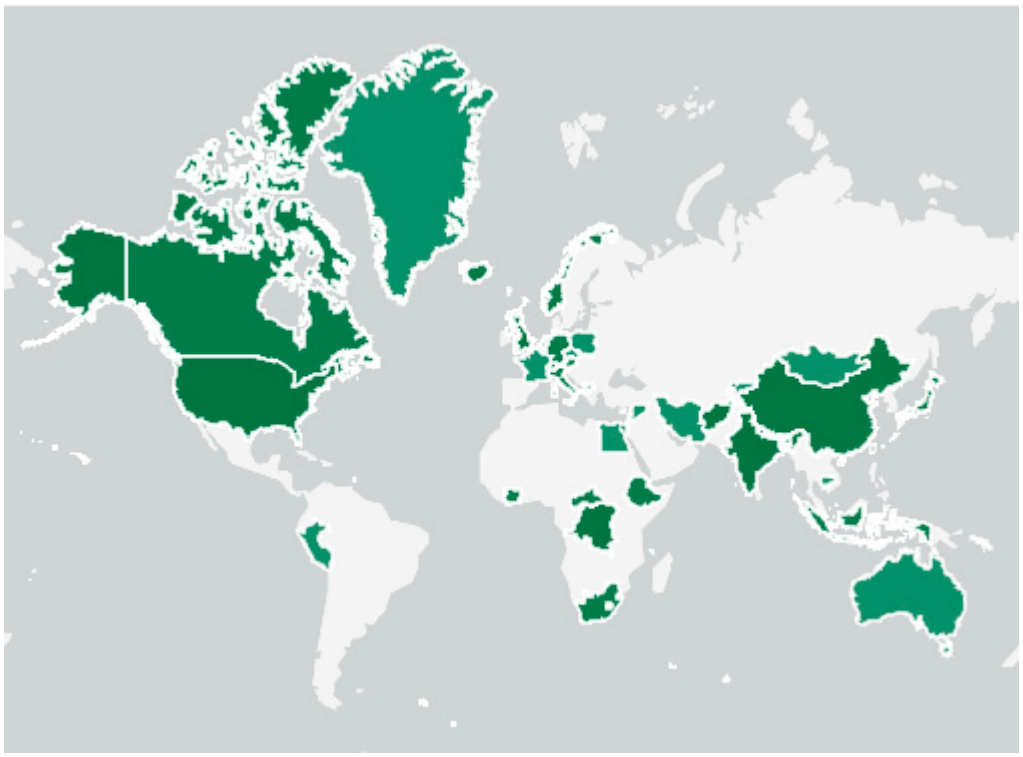

Figure 4. Geographical location and coverage of the selected studies. Note that the intensity of the color indicates the frequency of studies per country.

In the following, the focus of reviewed publications is given regarding the types of cultural landscapes. While cultural landscapes may encompass small components such as

trees, they may also refer to the processes and physical forms that characterize them such as land-use, as seen in Figure 5. Cultural landscapes (general) refer to the mentioning of them without a specific focus. Mix reflects the sites with a combination of several different components such as meadows, villages, vineyards, farm houses, and more [50].

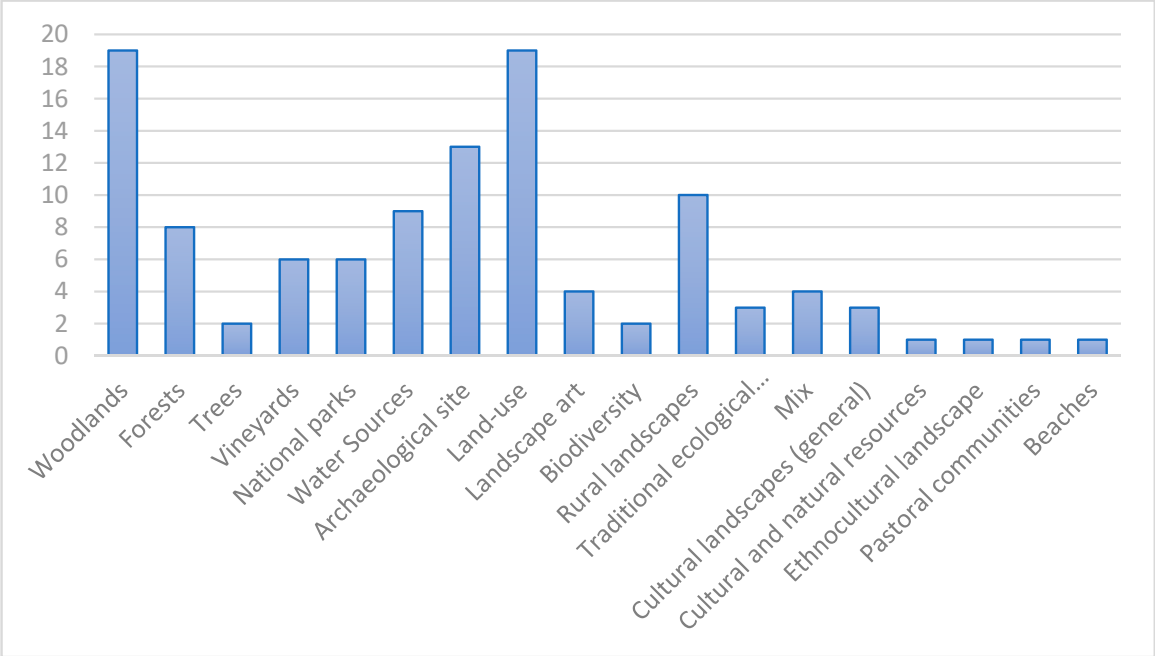

Figure 5. The types, components, and characteristics of cultural landscapes in the reviewed publications. Note that they are grouped under a broader umbrella. For example, woodlands refer to pine, oak woodlands, heathlands, and orchard meadows.

A considerable number of studies signaled the presence of woodlands (n = 19) and land-use (n = 19). Although quite a number of the studies addressed the archaeological sites (n = 13), rural landscapes (n = 10), water resources (n = 9), and forests (n = 8) also reflect the increasing trend in the literature. Despite being at the heart of the cultural landscape studies, vineyards and national parks (n = 6) have not received much interest. Mixed sites, landscape art (n = 4), traditional ecological knowledge, cultural landscapes (general) (n = 3) trees, biodiversity (n = 2), cultural and natural resources, ethnocultural landscapes, pastoral communities, and beaches (n = 1) have the least density among the number of 112 publications.

There is a wide range of constraints, challenges, and barriers that hinder planning for climate adaptation on cultural landscapes. In the literature review, most of the publications (n = 78. 70%) acknowledged and analyzed the barriers, limits, and challenges to adaptation and preserving cultural landscapes. We implemented descriptive coding of key barriers in building climate adaptation in cultural landscapes. Based on the content, we outlined the initial coding of key barriers as "policy challenge" and "practical challenge" under the main theme of "barriers [45]." Then, axial coding was used to classify barriers into four types: (1) institutional, (2) technical, (3) financial, and (4) socio-cultural barriers [45]. These principal codes were divided into 16 sub-codes. A sample of representative quotations was given to explain the barriers and their interdependencies from the publications (Table 1). Lastly, the interdependencies between the main barriers are discussed. Several of the reviewed articles discussed multiple barriers; thus, they were grouped in more than one category.

Table 1. Barriers of climate adaptation on cultural landscapes.

Categories of Barriers	Sub-Categories of Barriers	Quotations
Institutional	Climate adaptation policies	"The national heritage policy framework lacks environmental awareness [51]."
	Conflicting values and interests	"However, it is appropriate to consider the scale of these effects and match them to the needs of stakeholders (e.g., public bodies involved with the landscape, cultural heritage, geology) [52]."
	Sharing best practices	"There is a need for regional sharing of best practices, experiences, and technologies in Africa in priority sectors to raise awareness, engage stakeholders, and inform decision-making processes at all levels of governance [53]."
	Cultural heritage in climate change policies	"The absence of cultural heritage in the Intergovernmental Climate Change Panel Report (IPCC) is of particular concern [54]."
	Regulatory framework	"Thus, there is a need to establish new policies to coordinate, promote and expand the scope of woodland management as well as to develop locally-based forums for mitigating potential conflict [55]."
Technical	Collaboration and cooperation	"Cultural resource managers, historic preservation/curatorial staff, interpretation staff, and adaptation coordinators at the park and regional level must work together to preserve the sites and artefacts that represent and evidence American history [56]."
	Prioritization	"The abundance of sites and paucity of available resources require difficult choices about which areas should be protected/documented and should be left to decay, decisions that are often based on some notion of site significance [57]."
	Institutional support	"However, often such strategies are isolated practices or pilot studies and need institutional support (e.g., local NGOs) and research if they are to be replicated more widely [58]."
	Integrated approach in documentation and assessments of cultural landscapes	"Attention needs to be turned to a range and scale of issues beyond the traditional tasks of resource identification, documentation, and conservation intervention, either at a planning or site scale [59]."
	Integrated approach in understanding climate change vulnerabilities and risks	"Mitigating the direct and indirect impacts of climate change on World Heritage (both natural and cultural) requires an integrated approach. Protection and management of World Heritage must be considered in the context of managing environmental resources in the region in a sustainable way [60]."
	Methodological considerations	"The very act of identifying how management might affect ecosystem service provision also guides the key measurements that need to be made for a fuller quantitative understanding of the possible synergies and trade-offs [61]."
	Expertise	"The agencies responsible for conducting these project reviews are often understaffed and underfunded and often lack specific expertise in the preservation of archaeological resources, making effective oversight challenging [62]."
	Staff	"It will require reflective consideration of the integration of cultural and natural features, funding limitations, personnel availability, and overarching park management priorities [17]."
	Monitoring the evidence of the impacts of climate change on the landscapes	Those feedback between vegetation, surface temperature, water, and climate are crucial in landscape management, climate change discussions, and decision-makers and landscape developers [63].
Financial	Funding	"The question of defining the point at which the loss of resources is acceptable (or unacceptable) is particularly challenging, as decisions often rest on issues such as insufficient budgets, lack of potential reuse, or a range of conflicting demands on funding and historic sites [64]."

Table 1. *Cont.*

Categories of Barriers	Sub-Categories of Barriers	Quotations
Socio-cultural	Awareness	"Any path toward success will require large-scale education efforts [65]." [1]

[1] Note that most of the reviewed publications investigated more than one barrier.

4. Results

This section analyzes the four main barriers and proposes potential solutions in overcoming these barriers. The findings highlighted that the category of technical barriers (n = 77. 53%) was the most frequently mentioned barrier (Figure 6). Following that, institutional (n = 50. 34%), socio-cultural (n = 17. 11%), and the financial barriers (n = 11. 8%) were reported (Figure 6). Within the technical barriers, the overall results revealed that the determinant of the *integrated approach in documentation and assessments of landscapes* was the greatest barrier to the building of climate resilience in cultural landscapes. The implications of each category are explained further.

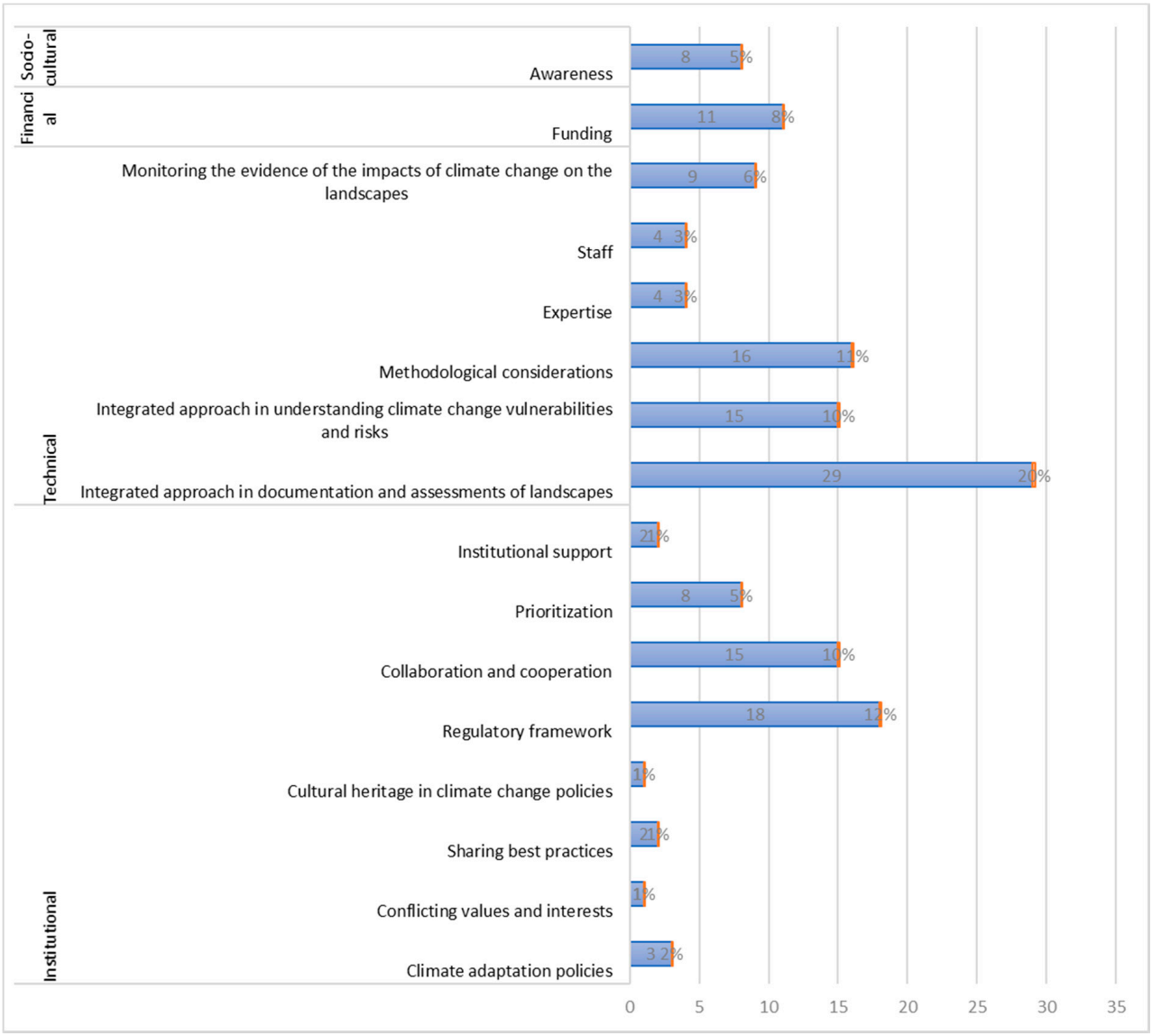

Figure 6. Number and percentages of each barrier per category out of 144.

4.1. Technical Barriers

Most of the publications (n = 77. 53%) explored the technical barriers such as (a) integrated approach in documentation and assessments of landscapes, (b) integrated approach in understanding climate change vulnerabilities and risks, (c) methodological considerations, (d) expertise, (e) staff, and (f) monitoring the evidence of the impacts of climate change on the landscapes.

The determinant of the *integrated approach in documentation and assessments of cultural landscapes* (n = 29. 20%) was the most quoted technical barrier. It is noted that the documentation and assessment of cultural landscapes should contain the cultural and natural (heritage) resources [17,57,59,66–69], including vernacular architecture [70], archaeological resources [62,64,71,72], and ethno-cultural heritage [73]. Cultural landscapes include woodlands [55], forests, water systems, vineyards, national parks [74], and archaeological and mixed sites. Additionally, considering the multi- and inter-disciplinary nature of the theme of cultural landscapes, cultural [75] and ecosystem services [76], biodiversity [23,77], vegetation and land cover [63,78], and land-use changes [79,80] should be embedded into the documentation of cultural landscapes to capture the "whole story." Along with its intangible values, it is essential to further investigate traditional ecological knowledge [81,82], traditional agricultural knowledge [83], and local fire ecology [84,85].

Of the included publications, an *integrated approach in understanding climate change vulnerabilities and risks* (n = 15. 10%) was the next frequently discussed technical barrier. The impacts of climate change on cultural landscapes should recognize the human-induced disturbances related to the changes in vegetation [86–92], ecosystem, and biodiversity [93]. Furthermore, there is a knowledge gap in understanding the direct and indirect threats of climate change [55,60,69]. Reviewed publications emphasized the significance of understanding the interactions between human activities (e.g., change in land use, -cover, and biodiversity) and climate change in the context of cultural landscapes.

Beyond the knowledge gap, the determinant of *methodological considerations* (n = 16. 11%) seeks to describe the constraints and limitations in available evidence (e.g., on the multidimensional benefit of cultural heritage preservation) [67], data (e.g., available historical and projected climatic data) [74], methods, and tools and methodologies to improve the drought resilience of woody plant species [94]. Several publications mentioned the gap in the use of quantitative methods of understanding the interactions between land-use, -cover, and climatic changes [61,95–97]. Particularly, the application of hydrological modeling in large areas such as in the river basin of Okavango in Botswana, Africa [98] and the validation procedures as indicated in the case of agricultural land use in Austria [99] were found to be challenging. In addition, there is a gap in the use of systematic reviews [100], single case studies and meta-analysis [5], satellite images [101], field surveys [62], and the methods that can detect climatic risks and land-use changes [102].

The determinants of *expertise* (n = 4. 3%) and *staff* (n = 4. 3%) were equally mentioned in the selected publications. There is a need for qualified staff expertise [74] in several aspects, including expertise in archaeological heritage preservation [62], fire vulnerability assessments [20], and ecosystem services [103]. The understaffing in the maintenance of coastal heritage [56] and globally designated cultural and natural heritage sites [104] are considered as a constraint in staffing capacity.

Monitoring the evidence of the impacts of climate change on the landscapes (n = 9. 6%) included reference to the site monitoring [17,105] and the specific threats such as sea-level rise that archaeological sites and resources face in the South East coasts of the Unites States [71]. In order to determine the site sensitivity to climate change [67], there is a need to closely monitor the emerging dynamics in cultural landscapes, particularly woody plants of the Mapungubwe Cultural Landscape in Africa [89].

4.2. Institutional Barriers

The institutional barriers (n = 50. 34%) were the second-most mentioned barrier among all. The determinant of the *regulatory framework* (n = 18. 12%) was the most cited institutional barrier. It emerges from the lack of protocols, agreements, regulations, laws, and policies that recognize climate realities [56] in adaptive planning [82,106]. It also refers to the fragmented, limited, conflicting, inconsistent, and contradicting policies for safeguarding cultural landscapes under the threat of climate change. There is a need for frameworks and policies for the multidimensional aspects of cultural landscapes, including food policies [107], fire prevention [108], sustainable tourism [109], and environmental awareness in the national heritage framework [51].

Another driver of *collaboration and cooperation* (n = 15. 10%) requires a participatory approach with inclusion and communication of a wide range of stakeholders [58,68,103]. For example, in dealing with the conservation of cultural landscapes, there is a need for an interaction of farmers with different jurisdictions (e.g., water or forest authorities) in the Swiss Alpines [81] and indigenous stakeholder communities of the Solomon Islands [75]. In addition, it appears that the decision-making processes should involve cross-sectoral collaborative work from the professionals in the fields of landscape, heritage, and geology, such as lessons learnt from the analysis of cultural landscapes of Cyprus by the use of Earth Observation and Remote Sensing in combination with Geographic Information Systems [52].

Prioritization (n = 8. 5%) of heritage resources is particularly significant in planning climate adaptation in cultural landscapes. Loss and damage of heritage resources are anticipated; thus, it requires the prioritization of national parks in the U.S. [74] and cultural resources within them [56]. It implies that the needs and significance of places e.g., in mountainous landscapes of Rolwaling Valley in Nepal [92], the resources in need of preservation urgently [71], and structures in priority of repair [64] should be prioritized. Finally, it is evaluated in the management of traditional lands [105] and the sites that are likely to change first [78].

Surprisingly, *climate adaptation policies* (n = 3. 2%) were rarely and generally addressed as a barrier. However, it was suggested that there is a need for more long-term adaptation through planning and autonomous adaptation practices [110]. In addition, the late implementation of ambitious climate adaptation policies was considered as a barrier [68]. Similarly, there is an emphasis on the integration of climate crisis into the heritage policy framework [51].

Sharing best practices (n = 2. 1%) is related to the transfer of knowledge, technologies, experience, and practices [53] between cultural landscapes and environmental stakeholders, especially in the case of Africa. The isolation of practices and studies of multi-stakeholder participatory approaches [111] is a barrier to achieve water security of the Himalayan region of India against severe droughts.

Competing priorities and conflicting interests (n = 1. 1%) explains the conflicting values of different stakeholders in the evaluation of the proposals in regard to the environmental assessments of archaeological resources in the Arctic. For example, there may be a pursuit of economic opportunities, benefits, and interests toward the decision-making process [62], which can hinder the climate adaptation of cultural landscapes.

The least investigated institutional barrier was the determinant of *cultural heritage in climate change policies* (n = 1. 1%). There is a need for adaptation of the existing approaches to the preservation of cultural heritage [64].

4.3. Financial Barriers

Financial barriers to the climate adaptation of cultural landscapes call for *funding* (n = 11. 8%). The lack of financial incentives in the effective management of cultural heritage under the changing climate is a significant obstacle [67]. Therefore, more funding is necessary and required for the conservation and preservation of cultural landscapes because rural and agricultural patterns of Australia's cultural landscapes are being lost [65].

4.4. Socio-Cultural Barriers

The results also shed light on the need for raising *awareness* (n = 17. 11%). Lack of *awareness* [53,92] can be perceived as a constraint in building climate adaptation in cultural landscapes. Education on climate change and its impact on cultural heritage is limited [23,104]. More education and awareness are required to overcome the challenges and barriers [56], come up with potential solutions, e.g., for the challenges of climate change in the management of dykes and dykelands in Nova Scotia in Canada [112], and adaptive strategies [64], particularly in large-scale planning [65].

5. Discussion

The conducted systematic review in this study enables us to understand better the main barriers to building climate resilience in cultural landscapes. Although the cultural heritage resources have gained visibility in recent years [74], their possible limitations and obstacles in terms of climate resilience have not yet been systematically analyzed. Therefore, this study primarily addressed the fundamental barriers and the interrelation between these determinants for generating possible solutions.

The results showed that undertaking climate adaptation in cultural landscapes is interrupted by the most effective determinants of technical and institutional barriers with the least effective constraints of financial and socio-cultural barriers. These barriers are not exclusive and isolated; instead, they are complementary. Fundamentally, the identified barriers are often interlinked and mentioned together. For example, *monitoring the evidence of the impacts of climate change on the landscapes* as a technical barrier and *prioritization* as an institutional barrier are intertwined [64,71,105]. A lack of monitoring of the sites may hinder the process of choosing the cultural and natural heritage resources to prioritize in building climate adaptation. Similarly, the need for *staff* and *expertise* as technical barriers is mentioned, with a lack of *funding* as a financial barrier [17,56,62,74,104].

Often, these barriers are internally connected. To give an example, an *integrated approach in documentation and assessments of landscapes*—the most constraining factor in building climate adaptation in cultural landscapes—is emphasized together with an *integrated approach in understanding climate change vulnerabilities and risks* [23,55,85]. Moreover, *monitoring the evidence of the impacts of climate change on the landscapes* intersects with either of these two determinants of the *integrated approach in documentation and assessments of landscape* [17] and the *integrated approach in understanding climate change vulnerabilities and risks* [89]. *Collaboration and cooperation* has been addressed with a *regulatory framework* as institutional barriers [55,56,81,103,113]. Although some of these determinants (technical and institutional barriers) share more commonalities than the others, all of them are interconnected.

Another consideration is that cultural heritage and planning organizations are at a distinct stage of preparedness regarding how well they are equipped to adapt to climate change. This condition could considerably affect all climate adaptation phases, such as assessment, policymaking, and implementation. For example, although local governments are the first responders for climate-related risks such as floods, many municipalities may not be sufficiently equipped to deal with floods. This means that they need additional authority, information, support, and education to deal with the complexity of climate change decisions and their impacts on cultural landscapes. Therefore, cultural landscapes need a model of how exchanging information should be developed among different stakeholders at the local scale, including public administrators, citizens, and researchers [31].

To be able to respond to these barriers in a systematic process, cultural heritage institutions and territorial planners need to develop place-based governance and a participatory adaptation framework at the local level. This type of governance is supposed to consider the local community's needs, their participation in decision-making, and its ability to express self-recognition of its identity and heritage [114]. The cultural community, therefore, interacting with, recognizing, and relating to its living environment and natural dynamics [115], takes on the role of cultural landscape actor, initiating a process of "territorialization," namely, sustainable development built on identity and natural resources [116]. In order to overcome the barriers to climate resilience, cultural landscapes need to initiate a process of community building and foster the local communities' ability to develop climate adaptation strategies. In terms of implementation, it is necessary to leverage two aspects: the development of social ties and improving the level of empowerment of the community [117–119].

In summary, cultural landscapes demonstrate a promising avenue in understanding the barriers to climate adaptation, considering their integrated systems in spatial and territorial planning. However, there is a need for more data, research, and tools in understanding the complex systems of cultural landscapes under the threat of climate change prior to planning for climate adaptation.

6. Conclusions

As part of cultural heritage resources, cultural landscapes are an irreplaceable and unique asset that exhibits a cultural group's continuous and evolved interactions with natural resources and the environment. However, the risks posed by climate change have emerged as a significant threat to the sustainability of these areas worldwide. Although considerable efforts have been made with vulnerability assessments of cultural landscapes, fewer studies have explored the main barriers to building climate resilience in cultural landscapes. In this study, we considered cultural landscapes as a system of synergistic relationships between the unique qualities of the physical environment, the built environment, and the anthropic environment. The findings revealed that the promotion of climate adaptation capacity in cultural landscapes needs a regulatory framework to support effective collaboration and cooperation among all the local stakeholders that often participate in the planning process with various ambition, interest, and awareness levels. Our finding also suggested that the identified barriers, namely technical, institutional, financial, and socio-cultural, are internally connected. Therefore, an integrated approach in documentation and assessment is the most constraining factor in building climate resilience in cultural landscapes. Further research is needed to understand how landscape planning can engage and empower the local community in the integrated approach as a necessary action that enhances cultural landscape sustainability in a changing climate.

Author Contributions: Conceptualization, G.A. and A.S.D.; methodology, G.A. and A.S.D.; validation, G.A. and A.S.D.; investigation, G.A. and A.S.D.; writing—original draft preparation, G.A.; writing—review and editing, G.A. and A.S.D.; visualization, A.S.D.; All authors have read and agreed to the published version of the manuscript.

Funding: This research received no external funding.

Conflicts of Interest: The authors declare no conflict of interest.

References

1. Rowntree, L.B.; Conkey, M.W. Symbolism and the Cultural Landscape. *Ann. Assoc. Am. Geogr.* **1980**, *70*, 459–474. [CrossRef]
2. Jones, M. The Concept of Cultural Landscape: Discourse and Narratives. In *Landscape Interfaces: Cultural Heritage in Changing Landscapes*; Palang, H., Fry, G., Eds.; Springer: Dordrecht, The Netherlands, 2003; pp. 21–51.
3. Schmitz, M.F.; Herrero-Jáuregui, C. Cultural Landscape Preservation and Social–Ecological Sustainability. *Sustainability* **2021**, *13*, 2593. [CrossRef]
4. Kirchhoff, T. Pivotal cultural values of nature cannot be integrated into the ecosystem services framework. *Proc. Natl. Acad. Sci. USA* **2012**, *109*, E3146. [CrossRef]

5. Bürgi, M.; Bieling, C.; von Hackwitz, K.; Kizos, T.; Lieskovský, J.; Martín, M.G.; McCarthy, S.; Müller, M.; Palang, H.; Plieninger, T.; et al. Processes and driving forces in changing cultural landscapes across Europe. *Landsc. Ecol.* **2017**, *32*, 2097–2112. [CrossRef]
6. Selman, P. *Sustainable Landscape Planning: The Reconnection Agenda*; Routledge: London, UK, 2012; pp. 1–166. [CrossRef]
7. Berkes, F.; Berkes, F. *Sacred Ecology*, 1st ed.; Routledge: New York, NY, USA, 2008.
8. Berkes, F. Shifting perspectives on resource management: Resilience and the Reconceptualization of 'Natural Resources' and 'Management'. *MAST* **2010**, *2010*, 13–40.
9. Rössler, M. World Heritage cultural landscapes: A UNESCO flagship programme 1992–2006. *Landsc. Res.* **2006**, *31*, 333–353. [CrossRef]
10. UNESCO. *Cultural Landscapes: The Challenges of Conservation*; UNESCO: Paris, France, 2003.
11. Larsen, P.B.; Wijesuriya, G. Nature-Culture Interlinkages in World Heritage: Bridging the Gap. *Georg. Wright Forum* **2017**, *34*, 142–153.
12. López Sánchez, M.; Tejedor Cabrera, A.; Linares Gómez Del Pulgar, M. Guidelines from the heritage field for the integration of landscape and heritage planning: A systematic literature review. *Landsc. Urban Plan.* **2020**, *204*, 103931. [CrossRef]
13. Scazzosi, L. Reading and assessing the landscape as cultural and historical heritage. *Landsc. Res.* **2004**, *29*, 335–355. [CrossRef]
14. Taylor, K. Landscape and meaning: Context for a global discourse on cultural landscapes values. In *Managing Cultural Landscapes*; Taylor & Francis Group: Hoboken, NJ, USA, 2012.
15. Shirvani Dastgerdi, A.; Massimo, S.; Ilenia, P. Climate Change Challenges to Existing Cultural Heritage Policy. *Sustainability* **2019**, *11*, 5227. [CrossRef]
16. Council of Europe. *European Landscape Convention*; Council of Europe: Strasbourg, France, 2000.
17. Melnick, R.Z. Deciphering cultural landscape heritage in the time of climate change. *Landsc. J.* **2016**, *35*, 287–302. [CrossRef]
18. Hauser, S.J. Long Live the Heritage of Petroleum—Discoveries of Former Oil Sites in the Port City of Dunkirk. *Urban Sci.* **2020**, *4*, 22. [CrossRef]
19. Aktürk, G. The Rural Landscape as Heritage in Turkey Under Changing Climate/Le Paysage Rural Turque, un Patrimoine Soumis au Changement Climatique. *Rural Herit. Landsc. Beyond/Patrim. Rural Paysages Au-Delà.* **2019**, *4*. [CrossRef]
20. Davis, C.M. Effects of Climate Change on Cultural Resources in the Northern Rockies. In *Climate Change and Rocky Mountain Ecosystems*; Halofsky, J.E., Peterson, D.L., Eds.; Advances in Global Change Research; Springer: Cham, Switzerland, 2018; Volume 63, pp. 209–219.
21. Aktürk, G. Remembering traditional craftsmanship: Conserving a heritage of woodworking in Rize, Turkey. *Int. J. Intang. Herit.* **2020**, *15*, 134–146.
22. Aktürk, G.; Lerski, M. Intangible Cultural Heritage: A Benefit to Climate-Displaced and Host Communities. *J. Environ. Stud. Sci.* **2021**, *11*, 305–315. [CrossRef]
23. Samuels, K.L. Biodiversity in World Heritage Cultural Landscapes: Possibilities and Problems for Communicating Climate Change and Mobilizing Mitigation. *Cult. Agric. Food Environ.* **2017**, *39*, 116–126. [CrossRef]
24. Fatoric, S.; Seekamp, E. Are Cultural Heritage and Resources Threatened by Climate Change? A Systematic Literature Review. *Clim. Chang.* **2017**, *142*, 227–254. [CrossRef]
25. Orr, S.A.; Richards, J.; Fatorić, S. Climate Change and Cultural Heritage: A Systematic Literature Review (2016–2020). *Hist. Environ. Policy Pract.* **2021**, 1–43. [CrossRef]
26. Sesana, E.; Gagnon, A.S.; Bertolin, C.; Hughes, J. Adapting Cultural Heritage to Climate Change Risks: Perspectives of Cultural Heritage Experts in Europe. *Geosciences* **2018**, *8*, 305. [CrossRef]
27. Sesana, E.; Gagnon, A.S.; Bonazza, A.; Hughes, J.J. An integrated approach for assessing the vulnerability of World Heritage Sites to climate change impacts. *J. Cult. Herit.* **2019**, *41*, 211–224. [CrossRef]
28. Cacciotti, R.; Kaiser, A.; Sardella, A.; De Nuntiis, P.; Drdácký, M.; Hanus, C.; Bonazza, A. Climate change-induced disasters and cultural heritage: Optimizing management strategies in Central Europe. *Clim. Risk Manag.* **2021**, *32*, 100301. [CrossRef]
29. ICOMOS Climate Change and Cultural Heritage Working Group. *The Future of Our Pasts: Engaging Cultural Heritage in Climate Action*; ICOMOS: Paris, France, 2019.
30. Melnick, R.; Kerr, N.; Malinay, V.; Burry, O.; Burry-Trice, O. *Climate Change and Cultural Landscapes: A Guide to Research, Planning, and Stewardship*; Department of Landscape Architecture: Eugene, OR, USA, 2017.
31. 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]
32. IPCC. *Climate Change 2007: Impacts, Adaptation, and Vulnerability. Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change*; IPCC: Geneva, Switzerland, 2007.
33. Adger, W.N.; Agrawala, S.; Mirza, M.M.Q.; Conde, C.; O'Brien, K.; Pulhin, J.; Pulwarty, R.; Smit, B.; Takahashi, K. *Assessment of Adaptation Practices, Options, Constraints And capacity. Climate Change: Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change*; Cambridge University Press: Cambridge, UK, 2007; pp. 717–743.
34. Plieninger, T.; Bieling, C. *Resilience and the Cultural Landscape: Understanding and Managing Change in Human-Shaped Environments*; Cambridge University Press: Cambridge, UK, 2010; pp. Xiii–Xvi. [CrossRef]

35. Melnick, R.Z. Climate Change and Landscape Preservation: Rethinking Our Strategies. *Chang. Time* **2015**, *5*, 174–179. [CrossRef]
36. Aktürk, G.; Hauser, S.J. Detection of Disaster-Prone Vernacular Heritage Sites at District Scale: The Case of Fındıklı in Rize, Turkey. *Int. J. Disaster Risk Reduc.* **2021**, *58*. [CrossRef]
37. Klein, R.J.T.; Midgley, G.F.; Preston, B.L.; Alam, M.; Berkhout, F.G.H.; Dow, K.; Shaw, M.R. Adaptation opportunities, constraints, and limits. In *Climate Change 2014: Impacts, Adaptation, and Vulnerability. Part A: Global and Sectoral Aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change*; Cambridge University Press: Cambridge, UK; IPPC: New York, NY, USA, 2014; pp. 899–943.
38. Eisenack, K.; Moser, S.C.; Hoffmann, E.; Klein, R.J.T.; Oberlack, C.; Pechan, A.; Rotter, M.; Termeer, C.J.A.M. Explaining and overcoming barriers to climate change adaptation. *Nat. Clim. Chang.* **2014**, *4*, 867–872. [CrossRef]
39. Biesbroek, G.R.; Klostermann, J.E.M.; Termeer, C.J.A.M.; Kabat, P. On the nature of barriers to climate change adaptation. *Reg. Environ. Chang.* **2013**, *13*, 1119–1129. [CrossRef]
40. Roggero, M.; Bisaro, A.; Villamayor-Tomas, S. Institutions in the climate adaptation literature: A systematic literature review through the lens of the Institutional Analysis and Development framework. *J. Inst. Econ.* **2018**, *14*, 423–448. [CrossRef]
41. Biesbroek, R.; Berrang-Ford, L.; Ford, J.D.; Tanabe, A.; Austin, S.E.; Lesnikowski, A. Data, concepts and methods for large-n comparative climate change adaptation policy research: A systematic literature review. *Wiley Interdiscip. Rev. Clim. Chang.* **2018**, *9*, e548. [CrossRef]
42. Antwi-Agyei, P.; Dougill, A.J.; Stringer, L.C. Barriers to climate change adaptation: Evidence from northeast Ghana in the context of a systematic literature review. *Clim. Dev.* **2015**, *7*, 297–309. [CrossRef]
43. Measham, T.G.; Preston, B.L.; Smith, T.F.; Brooke, C.; Gorddard, R.; Withycombe, G.; Morrison, C. Adapting to climate change through local municipal planning: Barriers and challenges. *Mitig. Adapt. Strateg. Glob. Chang.* **2011**, *16*, 889–909. [CrossRef]
44. Fatoric, 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]
45. Fatorić, S.; Biesbroek, R. Adapting cultural heritage to climate change impacts in the Netherlands: Barriers, interdependencies, and strategies for overcoming them. *Clim. Chang.* **2020**, *162*, 301–320. [CrossRef]
46. Aktürk, G.; Fatorić, S. Roundtable III: Climate Change Adaptation of Cultural Heritage. In *LDE Heritage Conference on Heritage and the Sustainable Development Goals: Proceedings*; Pottgiesser, U.C., Hein, S.F., de Maaker, E., Pereira Roders, A., Eds.; TU Delft Open: Delft, The Netherlands, 2021; pp. 521–523.
47. Erlingsson, C.; Brysiewicz, P. A hands-on guide to doing content analysis. *Afr. J. Emerg. Med.* **2017**, *7*, 93–99. [CrossRef]
48. Berrang-Ford, L.; Pearce, T.; Ford, J.D. Systematic Review Approaches for Climate Change Adaptation Research. *Reg. Environ. Chang.* **2015**, *15*, 755–769. [CrossRef]
49. Pearce, T.; Ford, J.D.; Duerden, F.; Smit, B.; Andrachuk, M.; Berrang-Ford, L.; Smith, T. Advancing adaptation planning for climate change in the Inuvialuit Settlement Region (ISR): A review and critique. *Reg. Environ. Chang.* **2011**, *11*, 1–17. [CrossRef]
50. Cianfaglione, K.; Chelli, S.; Campetella, G.; Wellstein, C.; Cervellini, M.; Ballelli, S.; Lucarini, D.; Canullo, R.; Jentsch, A. European Grasslands Gradient and the Resilience to Extreme Climate Events: The SIGNAL Project in Italy. In *Climate Gradients and Biodiversity in Mountains of Italy*; Pedrotti, F., Ed.; Geobotany Studies; Springer: Berlin, Germany, 2018; pp. 175–186.
51. Jeffery, T. Future-proofing South Africa's cultural museums: Climate change, heritage discourse and cultural landscapes. *S. Afr. Mus. Assoc. Bull.* **2017**, *39*, 19–28.
52. Cuca, B.; Tzouvaras, M.; Agapiou, A.; Lysandrou, V.; Themistocleous, K.; Nisantzi, A.; Hadjimitsis, D.G. *Earth Observation Technologies in Service to the Cultural Landscape of Cyprus: Risk Identification and Assessment*; International Society for Optics and Photonics: Bellingham, WA, USA, 2016.
53. Dovie, D.B.K. Africa's Environment: A Stressed Biogeographical and Cultural Landscape. In *International Encyclopedia of the Social & Behavioral Sciences*, 2nd ed.; Elsevier Inc.: Amsterdam, The Netherlands, 2015; pp. 292–299.
54. Sabbioni, C.; Cassar, M.; Brimblecombe, P.; Tidblad, J.; Kozlowski, R.; Drdacky, M.; Saiz-Jimenez, C.; Grontoft, T.; Wainwright, I.; Arino, X. Global Climate Change Impact on Built Heritage and Cultural Landscapes. In Proceedings of the International Conference on Heritage, Weathering and Conservation, HWC 2006, Madrid, Spain, 21–24 June 2006; pp. 395–401.
55. Yokohari, M.; Bolthouse, J. Keep it alive, don't freeze it: A conceptual perspective on the conservation of continuously evolving satoyama landscapes. *Landsc. Ecol. Eng.* **2011**, *7*, 207–216. [CrossRef]
56. Casey, A.; Becker, A. Institutional and Conceptual Barriers to Climate Change Adaptation for Coastal Cultural Heritage. *Coast. Manag.* **2019**, *47*, 169–188. [CrossRef]
57. O'Rourke, M.J.E. The map is not the territory: Applying qualitative Geographic Information Systems in the practice of activist archaeology. *J. Soc. Archaeol.* **2018**, *18*, 149–173. [CrossRef]
58. Hobbs, R. Woodland restoration in Scotland: Ecology, history, culture, economics, politics and change. *J. Environ. Manag.* **2009**, *90*, 2857–2865. [CrossRef]
59. Melnick, R.Z. Cultural landscapes and climate change: Protecting resources that matter in a future of uncertainty. In *New Cultural Landscapes*; Taylor and Francis: Abingdon, UK, 2014; pp. 223–240.
60. Ardakanian, R.; Hülsmann, S. Impact of global change on world heritage and on environmental resources: The need for an integrated management approach. In *Climate Change as a Threat to Peace: Impacts on Cultural Heritage and Cultural Diversity*; Peter Lang AG: Bern, Switzerland, 2015; Volume 19, pp. 101–117.

61. Fisher, B.; Bradbury, R.B.; Andrews, J.E.; Ausden, M.; Bentham-Green, S.; White, S.M.; Gill, J.A. Impacts of species-led conservation on ecosystem services of wetlands: Understanding co-benefits and tradeoffs. *Biodivers. Conserv.* **2011**, *20*, 2461–2481. [CrossRef]
62. Barr, B.W. "An ounce of Prevention is Worth a Pound of Cure": Adopting Landscape-Level Precautionary Approaches to Preserve Arctic Coastal Heritage Resources. *Resources* **2017**, *6*, 18. [CrossRef]
63. Hesslerova, P.; Pokorny, J.; Brom, J.; Rejskova-Prochazkova, A. Daily dynamics of radiation surface temperature of different land cover types in a temperate cultural landscape: Consequences for the local climate. *Ecol. Eng.* **2013**, *54*, 145–154. [CrossRef]
64. Sargent, L.; Slaton, D. Heading into the wind: Climate change and the implications for managing our cultural landscape legacy. *Chang. Time* **2015**, *5*, 200–224. [CrossRef]
65. Lennon, J.L. Sustaining Australia's cultural landscapes. *Landsc. J.* **2016**, *35*, 271–286. [CrossRef]
66. Brown, M.; Murtha, T. Integrating natural and cultural resources in North American large-landscape conservation. *Environ. Pract.* **2019**, *21*, 57–68. [CrossRef]
67. Nocca, F. The Role of Cultural Heritage in Sustainable Development: Multidimensional Indicators as Decision-Making Tool. *Sustainability* **2017**, *9*, 1882. [CrossRef]
68. Rosner, H.U. The Wadden Sea: A Natural Landscape outside the Dikes. In *Waddenland Outstanding*; Amsterdam University Press: Amsterdam, The Netherlands, 2018; pp. 81–93.
69. Pröbstl-Haider, U.; Kelemen-Finan, J.; Haider, W.; Schauenlehner, T.; Melzer, V.; Mostegl, N. Will climate change influence the attractiveness of cultural landscapes in Austria? In *Tourism and Leisure: Current Issues and Perspectives of Development*; Springer Science+Business Media: Berlin/Heidelberg, Germany, 2015; pp. 355–370.
70. Hardiilla, D.; Nugroho, A.C. Resilience Capacity Planning: A Strategy Requirement for Vernacular Architecture Existences as a part of Sustainable Development in Lampung. *IOP Conf. Ser.* **2020**, *409*, 012012. [CrossRef]
71. Anderson, D.G.; Bissett, T.G.; Yerka, S.J.; Wells, J.J.; Kansa, E.C.; Kansa, S.W.; Myers, K.N.; DeMuth, R.C.; White, D.A. Sea-level rise and archaeological site destruction: An example from the southeastern United States using DINAA (Digital Index of North American Archaeology). *PLoS ONE* **2017**, *12*, e0188142. [CrossRef] [PubMed]
72. Piovesan, G.; Mercuri, A.M.; Mensing, S.A. The potential of paleoecology for functional forest restoration planning: Lessons from Late Holocene Italian pollen records. *Plant Biosyst.* **2018**, *152*, 508–514. [CrossRef]
73. Dirin, D.A.; Fryer, P. The sayan borderlands: Tuva's ethnocultural landscapes in changing natural and sociocultural environments. *Geogr. Environ. Sustain.* **2020**, *13*, 29–36. [CrossRef]
74. Melnick, R.Z.; Kerr, N.R. Climate Change Impacts on Cultural Landscapes: A Preliminary Analysis in U.S. National Parks Across the Pacific West. *Landsc. Archit. Front.* **2018**, *6*, 112–125. [CrossRef]
75. Walter, R.K.; Hamilton, R.J. A cultural landscape approach to community-based conservation in Solomon Islands. *Ecol. Soc.* **2014**, *19*, 41. [CrossRef]
76. Garbarino, M.; Morresi, D.; Urbinati, C.; Malandra, F.; Motta, R.; Sibona, E.M.; Vitali, A.; Weisberg, P.J. Contrasting land use legacy effects on forest landscape dynamics in the Italian Alps and the Apennines. *Landsc. Ecol.* **2020**, *35*, 2679–2694. [CrossRef]
77. Hossein, A.; Djamali, M.; Ghorbanalizadeh, A.; And, E.R. Plant biodiversity of Hyrcanian relict forests, N Iran: An overview of the flora, vegetation, palaeoecology and conservation. *Pak. J. Bot.* **2010**, *42*, 231–258.
78. Bryn, A.; Dramstad, W.; Fjellstad, W.; Hofmeister, F. Rule-based GIS-modelling for management purposes: A case study from the islands of Froan, SOr-TrOndelag, mid-western Norway. *Norsk Geogr. Tidsskr.-Nor. J. Geogr.* **2010**, *64*, 175–184. [CrossRef]
79. Ziter, C.; Graves, R.A.; Turner, M.G. How do land-use legacies affect ecosystem services in United States cultural landscapes? *Landsc. Ecol.* **2017**, *32*, 2205–2218. [CrossRef]
80. Liu, C.J.; Jiao, Y.M.; Zhao, D.M.; Ding, Y.P.; Liu, Z.L.; Xu, Q. Effects of Farming Activities on the Temporal and Spatial Changes of Hydrogen and Oxygen Isotopes Present in Groundwater in the Hani Rice Terraces, Southwest China. *Water* **2020**, *12*, 265. [CrossRef]
81. von Glasenapp, M.; Thornton, T.F. Traditional Ecological Knowledge of Swiss Alpine Farmers and their Resilience to Socioecological Change. *Hum. Ecol.* **2011**, *39*, 769–781. [CrossRef]
82. Schwann, A. Ecological wisdom: Reclaiming the cultural landscape of the Okanagan Valley. *J. Urban Manag.* **2018**, *7*, 172–180. [CrossRef]
83. Garay, E.P.; Larrabure, J.L. Relational knowledge systems and their impact on management of mountain ecosystems: Approaches to understanding the motivations and expectations of traditional farmers in the maintenance of biodiversity zones in the Andes. *Manag. Environ. Qual. Int. J.* **2011**, *22*, 213–232. [CrossRef]
84. Adamek, M.; Jankovska, Z.; Hadincova, V.; Kula, E.; Wild, J. Drivers of forest fire occurrence in the cultural landscape of Central Europe. *Landsc. Ecol.* **2018**, *33*, 2031–2045. [CrossRef]
85. Johansson, M.U.; Frisk, C.A.; Nemomissa, S.; Hylander, K. Disturbance from traditional fire management in subalpine heathlands increases Afro-alpine plant resilience to climate change. *Glob. Chang. Biol.* **2018**, *24*, 2952–2964. [CrossRef] [PubMed]
86. Bryn, A.; Hemsing, L.O. Impacts of land use on the vegetation in three rural landscapes of Norway. *Int. J. Biodivers. Sci. Ecosyst. Serv. Manag.* **2012**, *8*, 360–371. [CrossRef]

87. Cui, Q.Y.; Gaillard, M.J.; Lemdahl, G.; Sugita, S.; Greisman, A.; Jacobson, G.L.; Olsson, F. The role of tree composition in Holocene fire history of the hemiboreal and southern boreal zones of southern Sweden, as revealed by the application of the Landscape Reconstruction Algorithm: Implications for biodiversity and climate-change issues. *Holocene* **2013**, *23*, 1747–1763. [CrossRef]
88. Fletcher, M.S.; Thomas, I. The origin and temporal development of an ancient cultural landscape. *J. Biogeogr.* **2010**, *37*, 2183–2196. [CrossRef]
89. Gandiwa, P.; Finch, J.; Hill, T. Vegetation structure and composition in the semi-arid Mapungubwe Cultural Landscape. *Glob. J. Environ. Sci. Manag.-GJESM* **2016**, *2*, 235–248. [CrossRef]
90. Liu, Z.; Yang, J.; Chang, Y.; Weisberg, P.J.; He, H.S. Spatial patterns and drivers of fire occurrence and its future trend under climate change in a boreal forest of Northeast China. *Glob. Chang. Biol.* **2012**, *18*, 2041–2056. [CrossRef]
91. Servera-Vives, G.; Riera, S.; Picornell-Gelabert, L.; Moffa-Sanchez, P.; Llergo, Y.; Garcia, A.; Mus-Amezquita, M.; Alvarez, S.G.; Trias, M.C. The onset of islandscapes in the Balearic Islands: A study-case of Addaia (northern Minorca, Spain). *Palaeogeogr. Palaeoclimatol. Palaeoecol.* **2018**, *498*, 9–23. [CrossRef]
92. Sherry, J.; Curtis, A.; Mendham, E.; Toman, E. Cultural landscapes at risk: Exploring the meaning of place in a sacred valley of Nepal. *Glob. Environ.Chang.-Hum. Policy Dimens.* **2018**, *52*, 190–200. [CrossRef]
93. Morimoto, Y. Biodiversity and ecosystem services in urban areas for smart adaptation to climate change: "Do you Kyoto"? *Landsc. Ecol. Eng.* **2011**, *7*, 9–16. [CrossRef]
94. Toth, A.; Kuczman, G.; Feriancova, L. Species composition and diversity of non-forest woody vegetation along roads in the agricultural landscape. *Cent. Eur. For. J.* **2016**, *62*, 56–66. [CrossRef]
95. Kidane, Y.; Stahlmann, R.; Beierkuhnlein, C. Vegetation dynamics, and land use and land cover change in the Bale Mountains, Ethiopia. *Environ. Monit. Assess.* **2012**, *184*, 7473–7489. [CrossRef]
96. McCollin, D.; Moore, L.; Sparks, T. The flora of a cultural landscape: Environmental determinants of change revealed using archival sources. *Biol. Conserv.* **2000**, *92*, 249–263. [CrossRef]
97. Winkler, K.J.; Nicholas, K.A. More than wine: Cultural ecosystem services in vineyard landscapes in England and California. *Ecol. Econ.* **2016**, *124*, 86–98. [CrossRef]
98. Mango, L.M.; Melesse, A.M.; McClain, M.E.; Gann, D.; Setegn, S.G. Land use and climate change impacts on the hydrology of the upper Mara River Basin, Kenya: Results of a modeling study to support better resource management. *Hydrol. Earth Syst. Sci.* **2011**, *15*, 2245–2258. [CrossRef]
99. Schonhart, M.; Schauppenlehner, T.; Schmid, E.; Muhar, A. Integration of bio-physical and economic models to analyze management intensity and landscape structure effects at farm and landscape level. *Agric. Syst.* **2011**, *104*, 122–134. [CrossRef]
100. Johnson, E. Landscapes and peoples of the Llano Estacado. In *Archaeological Landscapes on the High Plains*; University Press of Colorado: Boulder, CO, USA, 2008; pp. 115–156.
101. Cuca, B.; Agapiou, A. Impact of land-use change and soil erosion on cultural landscapes: The case of cultural paths and sites in Paphos district, Cyprus. *Appl. Geomat.* **2018**, *10*, 515–527. [CrossRef]
102. Berglund, B.E. Human impact and climate changes—Synchronous events and a causal link? *Quat. Int.* **2003**, *104*, 7–12. [CrossRef]
103. do Rosario, I.T.; Rebelo, R.; Caser, U.; Vasconcelos, L.; Santos-Reis, M. Valuation of ecosystem services by stakeholders operating at different levels: Insights from the Portuguese cultural montado landscape. *Reg. Environ. Chang.* **2019**, *19*, 2173–2185. [CrossRef]
104. Nations, J.D. How Do You Know Things Are Getting Better (Or Not)? Assessing Resource Conditions in National Parks and Protected Areas. In *Science and Stewardship to Protect and Sustain Wilderness Values*; Watson, A., Murrieta Saldivar, J., McBride, B., Eds.; USDA Forest Service Rocky Mountain Research Station Proceedings; USDA: Washington, DC, USA, 2011; Volume 64, pp. 165–168.
105. Lyons, I.; Hill, R.; Deshong, S.; Mooney, G.; Turpin, G. Protecting what is left after colonisation: Embedding climate adaptation planning in traditional owner narratives. *Geogr. Res.* **2020**, *58*, 34–48. [CrossRef]
106. Catalan, J.; Ninot, J.M.; Aniz, M.M. *High Mountain Conservation in a Changing World*; Catalan, J., Ninot, J.M., Aniz, M.M., Eds.; Advances in Global Change Research; Springer Nature: Berlin/Heidelberg, Germany, 2017; Volume 62, pp. 3–36.
107. Myskja, B.K. Conflicting food production values: Global free market or local production? In *Climate Change and Sustainable Development: Ethical Perspectives on Land Use and Food Production*; Wageningen Academic Publishers: Wageningen, The Netherlands, 2012; pp. 301–306.
108. Johansson, M.U.; Senay, S.D.; Creathorn, E.; Kassa, H.; Hylander, K. Change in heathland fire sizes inside vs. outside the Bale Mountains National Park, Ethiopia, over 50 years of fire-exclusion policy: Lessons for REDD. *Ecol. Soc.* **2019**, *24*, 26. [CrossRef]
109. Samora-Arvela, A.; Vaz, E.; Ferrão, J.; Ferreira, J.; Panagopoulos, T. Diversifying mediterranean tourism as a strategy for regional resilience enhancement. *Adv. Spat. Sci.* **2018**, 105–127. [CrossRef]
110. Adam, H.N.; Kjosavik, D.J.; Shanmugaratnam, N. Adaptation trajectories and challenges in the Western Ghats: A case study of Attappady, south India. *J. Rural Stud.* **2018**, *61*, 1–11. [CrossRef]
111. Sen, S.M.; Kansal, A. Achieving water security in rural Indian Himalayas: A participatory account of challenges and potential solutions. *J. Environ. Manag.* **2019**, *245*, 398–408. [CrossRef]
112. Sherren, K.; Loik, L.; Debner, J.A. Climate adaptation in 'new world' cultural landscapes: The case of Bay of Fundy agricultural dykelands (Nova Scotia, Canada). *Land Use Policy* **2016**, *51*, 267–280. [CrossRef]

113. Probstl-Haider, U.; Mostegl, N.M.; Kelemen-Finan, J.; Haider, W.; Formayer, H.; Kantelhardt, J.; Moser, T.; Kapfer, M.; Trenholm, R. Farmers' Preferences for Future Agricultural Land Use Under the Consideration of Climate Change. *Environ. Manag.* **2016**, *58*, 446–464. [CrossRef] [PubMed]
114. Pietta, A. Giacomo Becattini, Ritorno al territorio, Bologna, il Mulino, 2009. *Il Pensiero Economico Italiano* **2009**, *17*, 161–162.
115. Gambino, R.; Negrini, G. *Parchi e paesaggi d'Europa*; Urbanistica; INU Edizioni: Roma, Italy, 2009; pp. 82–85. ISSN 0042-1022.
116. Magnaghi, A. L'approccio territorialista. In *Il Progetto Locale- Verso la coscienza di luogo*; Bollati Boringhieri: Turin, Italy, 2000.
117. Pierantoni, I.; Sargolini, M. *Protected Areas and Local Communities: A Challenge for Inland Development*; Babel International, Libri: Mexico City, Mexico, 2020.
118. Dastgerdi, A.S.; De Luca, G. Religious Differences and Radical Spatial Transformations in Historic Urban Landscape. *Conserv. Sci. Cult. Herit.* **2019**, *19*, 191–203. [CrossRef]
119. Shirvani Dastgerdi, A.; Stimilli, F.; Pisano, C.; Sargolini, M.; De Luca, G. Heritage Waste Management: A Possible Paradigm Shift in the Post-Earthquake Reconstruction in Central Italy. *JCHMSD* **2019**, *10*, 76–89. [CrossRef]