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Spatial Planning for Tourism Destinations Resilient to Climate Change

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Abstract: Tourism and climate change have a two-way relation. Spatial planning can challenge this correlation, by making tourism destinations more resilient to climate change and tourism contributing less to the climate change acceleration. Based on literature review and theoretical research, this paper unravels the spatial structure of tourism destinations and presents systematically the way tourism affects—and is affected by—climate change. The objective of this paper is to articulate policy and planning recommendations and guidelines to address resilience against climate change at all destination scales. The paper identifies as most threatened the destinations facing extreme weather events, temperature fluctuations, and sea level rise (and more precisely the coastal and mountainous destinations), followed by areas facing water shortage and droughts, areas with fragile tourism resources (natural and cultural), and those experiencing overtourism. In regard to spatial planning for tourism (cross-cutting or sectoral), the paper argues that it has a proactive nature (making tourism destinations less vulnerable to climate change) but also can contribute to the earlier recovery of them after a disaster/damage has occurred. Spatial planning is also important for moderating the uncontrolled tourism growth responsible for climate change acceleration. A key conclusion is that a risk assessment and analysis should be an integral part of spatial tourism planning, focusing on the hazards and threats related to climate change.

Keywords: tourism destinations; resilience; climate change; tourism spatial planning

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1. Introduction

Tourism is a spatial phenomenon characterised by a constantly changing geography from the global to the local scale (Urry, 2002). Starting in the early 1950s in a few selected locations around the world, tourism very soon expanded and transformed many more areas into tourism destinations, with even more growth expected in the future (Page et al., 2001; Hartman, 2018). As a result of this constantly changing tourism geography, planning for tourism development and destinations has long been the focus of research. Recently, this research has considerably expanded to explore the unpredictable processes that tourism destinations undergo.

There is no doubt that humanity is at a stage of history that is experiencing many socio-economic, technological, environmental, etc., changes in a very short space of time. All these diverse challenges and factors from the 'outside' contextual environment, and global phenomena, need to be considered in tourism planning. Planning needs to adapt more and more to changes and sometimes threats that are either rapid or slow (Hall et al., 2017), for example, climate change, natural and technological disasters, innovations in technology, economic fluctuations, demographic changes and major migration flows, terrorism and wars, changes related to travel behaviour and tolerance, and many more

(Hartman, 2018). According to Lew (2014), all the above can be categorised as fast variables ('sudden shocks') or slow variables ('stresses'/'slow burns'). The impact of these variables and perturbations that bring the tourism industry and destinations out of balance should be identified, analysed, and monitored (Lew, 2014; Calgaro et al., 2014).

Finding a new balance in response to contextual circumstances that constantly change is a key challenge that in research and practice has been treated under resilience theories and theories of complex adaptive systems (Hartman, 2018; Walker et al., 2004; Martin-Breen & Anderies, 2011; Grove, 2018). As a term, resilience gained momentum a few decades ago. In the literature, resilience is treated in an interdisciplinary context, applied in different sciences (ecology and environmental sciences; social, political, and economic sciences; psychology; etc.), in all forms of governance, in different settings (urban, rural, insular, etc.), and towards different phenomena and threats (climate change, natural disasters, pandemic, etc.). In one of the most adopted definitions, resilience is "*the capacity of a system to absorb disturbance and reorganize while undergoing change so as to retain essentially the same function, structure, identity and feedbacks*" that existed before the perturbations began (Walker et al., 2004). This bouncing back to the state that existed before is not, however, the only perspective. More and more scholars address resilience under the evolutionary perspective that is about building systems that not only bounce back from shocks to their previous state, but also bounce forward to a new state as part of an adaptive and evolutionary process (Gunderson & Holling, 2002; Sharifi & Yamagata, 2018a). Moreover, under the evolutionary resilience perspective, a system adapts to major and sudden changes and shocks as well as to slow changes that last for longer periods (Davoudi, 2012; Coaffee, 2013; Sharifi & Yamagata, 2018b), such as climate change effects.

Spatial planning is a well-known discipline that is susceptible to the adoption of new concepts and terms. This could not be different in the case of 'resilience', which was introduced in the spatial planning literature over the last decade (Rega & Bonifazi, 2020) and is especially true under the evolutionary perspective (Sharifi & Yamagata, 2018a). According to Meerow et al. (2016, p. 39), evolutionary resilience in urban design is defined as "*the ability of an urban system and all its constituent socio-ecological and socio-technical networks across temporal and spatial scales to maintain or rapidly return to desired functions in the face of a disturbance, to adapt to change, and to quickly transform systems that limit current or future adaptive capacity*".

As a concept, resilience is usually used as the opposite of vulnerability (Miller et al., 2010), which is "the susceptibility of a system to disturbances determined by exposure to perturbations, sensitivity to perturbations and the capacity to adapt" (Nelson et al., 2007). At the same time, in the existing literature, the rising interest in resilience is followed by a declining excitement for sustainability (Rega & Bonifazi, 2020), addressing key questions such as whether resilience is a component of sustainability, if sustainability is a component of resilience, or if resilience and sustainability are separate concepts, although connected in many ways (Ahern, 2013; Chelleri et al., 2015; Marchese et al., 2018; Roostaie et al., 2019).

In regard to the case of tourism, the concept of resilience is mainly used as a positive statement and status, and it may be seen in many ways. It may concern individuals (whether as tourists, community members, or society), or organisations and entrepreneurs, or economies (at the micro- and macro-scale), or even destinations and tourism landscapes (and their natural and cultural capital/resources). Among the above perspectives, research on tourism destinations' resilience and especially on operationalisational matters (i.e., on how to build resilient destinations) is surprisingly limited (Hall et al., 2017; Hartman, 2018; Scott & Gössling, 2022, etc.). On the other hand, resilience receives increasing attention in fields such as urban and regional planning and in cases of areas under protection status, e.g., National Parks, etc. (Hall et al., 2017; Hartman, 2018). The challenge for tourism

destinations is to address vulnerability and become flexible enough to recover from losses and durable enough to withstand perturbations. Finally, another challenge for tourism destinations is to achieve net-zero emissions (Gössling et al., 2023a, 2023b) and mitigate their contribution to the effects of climate change.

When discussing resilience, it is necessary to be specific about two things: 'resilience of what' and 'resilience to what' (Sellberg et al., 2015). Based on literature review and theoretical research, this article stands as a policy paper, providing spatial planning guidelines and recommendations towards building tourism destinations resilient to climate change. The article starts by exploring the spatial structure of tourism destinations and identifies the way they are affected by—and they affect—climate change. Then, it continues by exploring the nature of spatial planning (cross-cutting or sectoral, for tourism) and the role it can play towards building resilient tourism destinations. The paper ends with a section providing spatial policy and planning recommendations and guidelines for the development of tourism destinations (at the local and regional scale) towards becoming resilient against climate change. The conclusion summarises the axis of planning interventions and shortcomings towards integrating resilience against climate change in spatial tourism planning. This study aims at contributing to the existing literature about resilience of tourism destinations, by shifting the focus to the role of spatial planning, and by organising in a systematic way the planning recommendations and guidelines, according to the type and structure of the destination and according to the planning scale. By doing so, it ultimately aims at serving as a useful tool for spatial planners (practitioners and scholars), having a special interest in tourism and the challenges related to climate change.

2. Tourism Destinations and Their Changing Geography

The term "tourism destination" is very frequently used in the tourism literature and research; however, there is no singular and broadly accepted definition, because of the variety of backgrounds and approaches of researchers and the objective of each study (Saraniemi & Kylänen, 2011; Pearce, 2014; Jovicic, 2016). According to a classification following strict geographical terms, "tourism destinations" may be distinguished in five categories: urban, coastal, insular, mountainous, and rural (including all other types of destinations) (Sarantakou, 2023). From a spatial perspective, what is a tourism destination may also considerably vary depending on terms of structure and size and scale observed. Under this perspective, a tourism destination may be a transnational area, a whole country, or a region but also a small-sized area receiving tourist flows. This paper (and section) builds mainly upon the last perception and unravels the spatial structure and characteristics of tourism destinations along the following lines.

Starting from the local level and scale, a tourism destination may be a single tourism attraction or a single tourism pole (for example, a ski resort, a spa resort, a thematic park, etc.). Tourism poles may be characterised by further complexity. According to Murphy (Murphy, 1985/1987), a tourism pole can also be seen as a wider spatial system consisting of a core area, the buffer/support zone, and the peripheral zone (Figure 1a). Another—simpler—version was also identified by Gunn (1988), who argued that tourism poles consist of a nucleus and its peripheral zone. At the local scale, apart from tourism poles, tourism zones may also be identified. Tourism zones usually constitute clusters of tourism poles and attractions forming a distinctive (tourism) product (Figure 1b). Examples of tourism zones at the local scale could be a city, a National Park, a small island, etc.

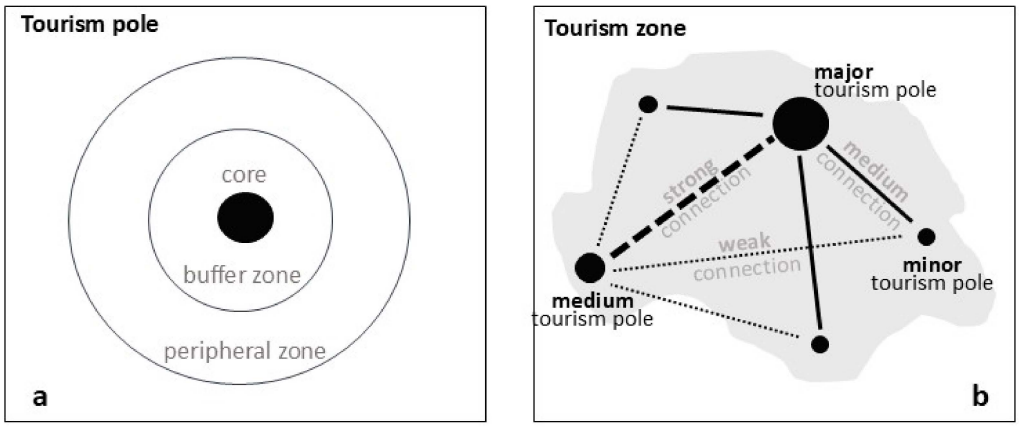

Figure 1. (**a**,**b**): Tourism destination structure and attributes at local scale (source: author's process).

Moving to a more strategic level (in terms of scale), a much wider area may also be considered as a tourism destination (Figure 2). This area could be cross-regional, national, or even transnational. An example of a large-scale tourism destination may be the Alps (in central Europe) that constitute an extensive and transnational mountainous complex, including several resorts, attractions, tourism infrastructures, and tourism-oriented urban settings. This means that, when observing from a macro-scale, tourism destinations may be large areas too, consisting of smaller tourism zones and poles.

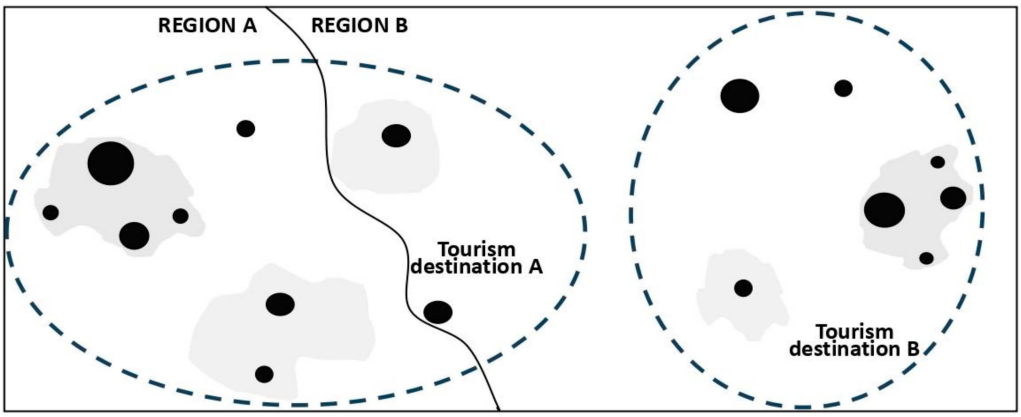

Figure 2. Tourism destinations' structure and attributes at regional/strategic scale (source: author's process).

Regardless of the scale and size, tourism destinations considerably vary in terms of growth, and range from the local and the regional to even the global scale (Hartman, 2018; Morley et al., 2014). These variations highly relate to the intensity of flows that a tourism destination receives. Looking at the global scale, in the past, tourist flows were concentrated in a few places around the world and mainly in Europe, North America, and to a lesser extent in Asia (Urry, 2002; Theobald, 2012). According to the latest data coming from the WTO (2023), nowadays, Europe accounts for almost one in two trips in the world (51%) and the arrivals keep growing at an annual rate of 5%. Asia and the Pacific account for one in four arrivals (25%), presenting a higher average growth rate of approximately 7%. The Americas account for 15% of global international trips, followed by Africa (5% of tourist flows), while the Middle East accounts for 4% of international arrivals. Cross-border and international travels are far greater in number and dispersion over time. The greatest volume of flows is traditionally observed within Europe, North America, and to a lesser extent in Asia, where flows present strong regional polarities in regard to the countries that

most tourists originate from, as well as the countries that are the most popular destinations (Urry, 2002; Terkenli, 2017).

These kinds of inequalities and polarities are not only observed at the global scale but also at the local, regional, and national scales. New destinations are added worldwide to the existing ones. These destinations are not only found in the new and developing tourism countries, but in the traditional tourism markets as well (Terkenli, 2017). Moreover, according to Papatheodorou (2003), small-scale tourism destinations may easily co-exist and concentrate around large-scale and overdeveloped destinations.

In short, tourist flows are constantly changing in a way that research often fails to understand and describe (Peeters & Landré, 2012). In the following section, the analysis focuses on the way that tourism destinations (and tourism growth in general) contribute to climate change and vice versa, i.e., how climate change affects tourism destinations. This will permit the drafting of spatial planning and policy guidelines and recommendations towards tourism destinations resilient to climate change.

3. The Way Tourism Destinations Affect—And Are Affected by—Climate Change

3.1. The Impact of Tourism Growth on Climate Change

Tourism has grown into a rapidly evolving industry since the second half of the 20th century. In fact, international arrivals went from 25 million in 1952 to 806 million in 2005. This annual growth of approximately 6.5% (WTO, 1994/1997) slowed down in the beginning of the 21st century and despite the 4% drop in 2009 (due to the global economic recession), between 2009 and 2019, the average growth per year was 5%. The worst year for global tourism was recorded in 2020; international tourist arrivals dropped by 72% because of the pandemic, and cross-border travels plunged from 1.5 billion (in 2019) to 400 million (WTO, 2023), putting global tourism back 30 years. Despite the 2020 shock, tourism is nonetheless a sector demonstrating great resilience and presenting continuous expansion over time. In fact, according to the latest estimations provided in the official site of the World Tourism Organisation, international tourism is on track to recover in 2024 by almost 90% of pre-pandemic levels.

This continuous growth of tourist flows, as well as the uneven concentration in specific destinations, has long triggered the interest of researchers and policy makers, who recognised the strong correlation between tourism and climate change acceleration. In fact, the research and relative literature on the impact of tourism on climate change go back to the 1980s, although the number of publications prior to 2000 is very limited (Scott & Gössling, 2022). Most cited works have focused on emissions at the global or national scale of tourism and to a lesser extent on the destination level (Scott & Gössling, 2022). In addition to researchers, international bodies too (such as the Intergovernmental Panel on Climate Change, the United Nations, the International Environmental Agency, etc.) place more and more emphasis in their official reports on how tourism contributes to climate change (UNEP, 2021; UN, 2021; IEA, 2021; IPCC, 2021).

According to these reports, the most important contributors to climate change are the emissions in the atmosphere [such as Green House Gases (GHGs) and CO_2 specifically]. Global tourism contributes significantly to these kinds of emissions since they are directly associated with travels of all types. The WTO estimates that emissions from international tourism will increase by 45% from 2016 to 2030. Domestic tourism emissions will increase by 21% (UNEP, 2021; WTO-ITF, 2019). In 2005, global tourism contributed between 5.2% and 12.5% of all anthropogenic emissions, with a best estimation of approximately 8% (Scott et al., 2012). This estimation was also made for 2013 by Lenzen et al. (2018), who estimated that global tourism had been responsible for 8% of the global CO_2-equivalent

emissions. Estimations made for 2018 consider that the tourism industry contributed by 8% to global warming, or by 10% including aviation (Gössling et al., 2023b). Future predictions, however, take for granted that tourism emissions will increase in absolute terms, as a result of the continuing growth of international and domestic travels (Hall et al., 2017; Gössling et al., 2012a).

Another point that is stressed regarding global emissions is that they are greatly affected by the increased demand for—and consumption of—energy in the tourism sector (WTO-ITF, 2019), contributing even more to global warming (UNEP, 2021). According to past global research performed by Gössling et al. (2012a), tourism-related energy consumption accounts for 14,080 power joules, 94% of which belongs to the transportation sector. In general, transport and accommodation account for 75% of the total tourism emissions. Aviation is the most prevailing air pollutant (representing 40% of tourism's overall carbon footprint), followed by car travels/transport (32%) and cruise ships to a lesser extent (around 1.5% of global tourism emissions) (Eijgelaar et al., 2016; Scott et al., 2016). According to Gössling et al. (2023b), the growth of emissions produced by cars and aeroplanes was only estimated at 6% as of 2020.

Apart from energy, water consumption too—which keeps growing in specific locations—indirectly affects climate change and the environment (Hadjikakou et al., 2012; Hall et al., 2017). Following the results of research at the global level (Gössling et al., 2012b), direct tourism-related water use is not significant. It represents considerably less than 1% of global consumption, and it will remain at this level even if the international tourist arrivals continue to grow at anticipated rates (i.e., around 4% per year). At the regional (and local) level, however, some tourism destinations are expected to be severely affected, especially those where tourist flows concentrate in time, and where water resources are limited. Apart from that, according to the same research (Gössling et al., 2012b), the more important tourism-related water consumption is not the direct use but the indirect use for food production and the construction of buildings, infrastructure, etc., in areas where tourist flows concentrate.

Another way that tourism contributes to climate change is through the land-cover and land-use changes introduced to a constantly growing number of areas globally (Williams & Shaw, 2009). The level of land-use/cover changes because of tourism is very difficult to track and monitor at the global scale (Boavida-Portugal et al., 2016). Even at the destination level (that data may be easier to access and track), tourism and recreation may be a non-exclusive use in many cases of facilities and/or lands (Williams & Shaw, 2009). However, tourism developments usually tend to take place in agricultural land, in natural and highly sensitive areas, and especially in the coastal zones, river and lake shores, and areas of natural and cultural significance, which constitute a major magnet for tourism development. Tourism development requires not only building infrastructure related to accommodation complexes and second homes, but also infrastructure related to special forms of tourism (e.g., conference halls, spa resorts). Moreover, tourism development requires upgraded transport infrastructure that all together result in extended urbanisation and land-take of previously agricultural or natural areas in favour of tourism-related uses. As a process, land-take is a key parameter leading to biodiversity loss, which also accelerates—and is accelerated by—climate change (Buckley, 1999; Pandya et al., 2023).

Considering the above, it becomes evident that not all destinations around the world contribute equally to climate change. In addition, as tourism continues to grow at the global scale, its contribution to climate change will keep rising, as a result of the greenhouse gas emissions (mainly from aviation and accommodation), the demand for increased water and energy consumption, and the land-take and land-sealing phenomena that will occur, especially in destinations that experience an overconcentration of flows. Taking for granted

that tourism travels, including longer-distance travels (based on air transportation), will keep increasing over time, and that more and more tourism destinations will experience an overconcentration of flows, it becomes of paramount importance to undertake urgent actions towards reconsidering tourism planning from the global to the local scale, with the goal to minimise the impact of tourism on climate change acceleration. Research trends already increasingly focus not only on strategies to reduce tourism emissions, but also on the optimal options and the costs of decarbonising the sector in general. Research is also directed at understanding and reducing the carbon risk of the tourism sector and in this way facilitating the transition to a state of net-zero emissions tourism destinations by the mid-21st century (Scott & Gössling, 2022).

3.2. The Impact of Climate Change on Tourism Destinations

Tourism destinations may also be deeply affected by climate change and its effects. This perspective has been the other pillar of research, in which the aim is not only to comprehend the impacts of climate change on tourism development and destinations but also to develop strategies towards reducing stress and maximising the benefits for the tourism sector. According to a recent literature review performed by Scott and Gössling (2022), the research published from this perspective can be grouped in thematic sections, such as global risks, tourism resources affected by climate change, changes in tourist behaviour, changes in the demand patterns, impacts on transportation, and mitigation and adaptation options. In this section, the focus is on the key effects of climate change, with respect to their impact on tourism destinations, their growth, and their image.

Among the most discussed effects of climate change on tourism destinations is risen temperature. Risen temperature mostly affects winter tourism resorts, resulting in changes in the snow regime and revenues. Following research in the South Tyrolean mountains in Italy (Falk, 2014), an increase of 1 degree Celsius in winter temperatures may lead to a decline of 8% in the number of arrivals (if snowmaking facilities are not used). On the other hand, risen temperature also contributes to the alteration (and degradation) of nature reserves and sensitive marine and terrestrial habitats (e.g., coral reefs are threatened to bleach), which constitute a valuable resource for the tourism industry (Goh, 2012; Falk, 2014). Moreover, some coastal areas are eventually getting 'too hot' and 'too dry' to spend time there. A recent study in Indonesia (Susanto et al., 2020) stated that every 1% increment of temperature results in a decrease in the number of international tourists by 1.37%. According to Hernandez and Ryan (2011), weather conditions seem to affect not only tourists' choice of a destination, but also their duration of stay. In terms of trips, day trips are more sensitive to risen temperature, followed by short breaks and then main holidays (Bigano et al., 2005).

Extreme weather events are another effect of climate change on the tourism industry and destinations. As indicated by several reports (UN, 2021), extreme weather events are already apparent and are expected to occur with a higher level of intensity as temperatures keep rising. Events such as heat waves, cold waves, storms, etc., are often responsible even for loss of life. In the case of tourism, apart from damages they directly cause to urban and rural settings (and their tourism infrastructure, their natural and cultural capital, etc.), they are often responsible for side effects, such as natural disasters (fires, floods, waves, etc.), resulting in more damage, including to their image in terms of security, which is key for tourism destinations (Hall et al., 2017). According to de Freitas (2006), hurricanes and intense storms are the form of extreme weather events posing the greatest threat to tourists and tourism infrastructure, given that they are very often in tropical areas where much coastal tourism is concentrated. On the other hand, the least threatening extreme weather

event is the heat wave, which is a phenomenon highly frequent in the Mediterranean (Moreno, 2010).

A sea level rise (SLR), another important effect of climate change, is becoming of growing concern for most coastal tourism destinations, given that this zone is of great interest for the tourism industry and is where more and more tourism infrastructure is concentrated. SLR is among the major consequences of global warming. The oceans expand because of the melting of ice sheets, leading to an increased vulnerability of coastal areas to flooding. Over the past two centuries, the global sea level has risen at faster rates than in the last two millennia (Dangendorf et al., 2017). The latest scenarios coming from the report of IPCC (2022) estimate that in 2100, the global sea level will rise from 0.61 up to 1.1m compared to the present sea level. This is expected to expose about 400 million people to coastal hazards. As in the above cases, SLR is a threat not only to technical infrastructure and tourism facilities located close to the seashore, but also to all kinds of natural and cultural (tourism) resources found in this zone (beaches, monuments, etc.) that are vital for the tourism industry. Recent research conducted in 30 islands of the Caribbean predicted that under a scenario of low CO_2 emissions, half (53%) of the sandy beaches will be lost, resulting in a 38% loss of tourism revenue (Spencer et al., 2022).

In short, although all tourism destinations of the world will be affected by climate change, some will be more affected than others (Hall et al., 2017). Coastal areas run the greatest risk because they are more exposed to multiple effects. Destinations that also face risk are those oriented to forms of tourism and tourism products sensitive to temperature fluctuations and extreme weather events (e.g., mountainous and winter tourism destinations, protected areas with fragile ecosystems, etc.). Then, areas with water shortages and droughts are very likely to become 'too hot' and 'too dry' and have increasing needs for energy consumption. Moreover, the impact of climate change, apart from causing direct losses on tourism destinations, may also trigger changes in the direction of tourist flows at all levels. At the local level, flows might be directed from the coastal zone to the mainland or the mountainous zone. In more strategic scales, flows may be redirected to completely new or emerging destinations in the same country or throughout the globe.

Considering the above, all tourism destinations (at all scales) will be forced to draft strategies to adapt to climate change and to mitigate the impacts of the risks associated with it. In other words, resilience against climate change should be a key objective of spatial planning related to tourism destinations. Among the tourism destinations, the most threatened are those located in the coastal and mountainous zones, followed by areas vulnerable to water shortages and droughts, areas with fragile natural and cultural ecosystems (that serve as tourism attractions), and destinations experiencing overtourism. These destinations are expected to undergo damage to their tourism facilities, infrastructure, and resources, and eventually losses in the tourist flows they receive. At the local scale, flows might be directed from the coastal zone to the mainland or the mountainous zone. At the regional level, flows may be redirected to completely new or emerging destinations across the globe.

4. Integrating Resilience into Tourism Spatial Planning

Spatial planning is defined as "*a transformative and integrative public sector-led, but coproductive, socio-spatial process through which visions or frames of reference, the justification for coherent actions, and the means for implementation are produced that shape, frame and reframe what a place is and what it might become*" (Albrechts, 2010, p. 1117).

Spatial planning has a two-fold dimension: it can 'cut across' sectors but also be sectoral and focus on a single sector's growth (Conyers & Hills, 1986) In the case of cross-cutting spatial planning, tourism is one of the many different sectors that should be tackled

towards the integrated and sustainable development of a certain region. On the other hand, in the case of sectoral spatial planning, tourism should be the only sector addressed. According to Tosun and Jenkins (1998), addressing tourism development through spatial planning has two implications/challenges. The first is about how to integrate the various components of the tourism sector in the spatial planning process. The second concern is "*integrating the tourism sector into the macro system which includes socio-cultural, economic, political, environmental factors and the international tourism distribution system itself*" (Tosun & Jenkins, 1998, p. 105).

A critical factor when performing tourism spatial planning (cross-cutting or sectoral) is the scale and geographical scope. According to the WTO (1994/1997), tourism is a sector that needs to be planned at two scales: the national and regional. Var and Gunn (2020), on the other hand, name three (3) scales, starting from the regional scale and downwards, naming also the destination scale and the site. Depending on the scale, planning guidelines may vary in type. At the national and regional scales/level, planning has a more strategic nature, whilst at the local level, it is expected to be more detailed (Davidson & Maitland, 1997/2002). Strategic and more detailed plans are not contradictory, and in many cases, they can coexist (Var & Gunn, 2020). For example, in the case of a large-scale tourism destination (e.g., a region), it might be necessary to adopt a plan that will refer to the regional level, but also have additional (specialised) plans for parts of the same region (as, for example, a certain tourism pole and/or a tourism zone/complex). This hierarchy and complementarity of plans is fundamental when performing spatial planning (cross-cutting or sectoral).

Spatial planning (cross-cutting or sectoral) is essential for tourism destinations, to allow them to evolve in a sustainable and prosperous manner. Especially nowadays that all types of tourism destinations—traditional and emerging—are more and more exposed to climate change effects, sooner or later, they will need to reduce their vulnerability and sensitivity to this kind of stressor. Spatial planning plays a crucial role in achieving resilient tourism destinations, as it is a flexible process in terms of scale (addressing aspects from the local scale to the national and beyond), while it also has a clearly proactive (a priori) nature/dimension (Albrechts, 2010). Through spatial planning, tourism destinations can more readily adapt to climate change effects (Davoudi et al., 2009; Coaffee, 2013). At the same time, they can contribute less to climate change, especially by preventing the growth of overtourism (in all places but especially in climate-sensitive areas) (Buitrago & Yñiguez, 2021) and by promoting zero-pollution targets (Beriatos & Papageorgiou, 2011; Vettorato et al., 2011). Apart from that, spatial planning is also the appropriate process for the recovery and reconstruction of an area (and a tourism destination) after a disaster has occurred.

Despite this important role, the literature correlating spatial planning of tourism destinations with resilience against climate change is surprisingly limited and indirectly addresses this topic. As argued in the Introduction Section and thoroughly presented in Section 3, most scholars focus on the contribution of tourism (and destinations) to the acceleration of climate change and on facilitating the transition of tourism destinations to a state of net-zero emissions (IEA, 2021; Gössling et al., 2023b). Moreover, they focus on the type and degree of vulnerability that tourism destinations undergo due to climate change, also placing emphasis on destinations that are considered the most vulnerable, for example, coastal zones (Spencer et al., 2022; León et al., 2023; Pang et al., 2023), small islands (Ley Bosch et al., 2024), mountainous zones (Hernandez & Ryan, 2011; Falk & Lin, 2018; Steiger et al., 2024), and urban/urbanised destinations (Day et al., 2021; Zhang & Zhang, 2020).

On the other hand, in regard to the literature addressing the role of spatial planning in mitigating climate change effects and achieving resilience, it can be categorised as

follows: The first category of the literature refers to resilience of buildings and infrastructure (Mosalam et al., 2018; Dong et al., 2021); therefore, it is mainly associated with guidelines for building design and architecture, as well as construction methods. The second category concerns resilience and urban planning (Ahern, 2013; Chelleri et al., 2015; Roostaie et al., 2019, etc.), i.e., how resilience can be achieved in urbanised areas (cities, urban settings, etc). The next category treats resilience and local planning as well as land-use planning (Wilson, 2006; Saunders & Becker, 2015; Dong et al., 2021), mainly trying to address issues of wise land management for the maintenance of valuable ecosystems (e.g., forests) over uncontrolled land-take phenomena, desertification, soil sealing, etc. A segment of this category can be the literature related to cases of areas under protection status, e.g., National Parks, etc. (Hall et al., 2017; Hartman, 2018). Finally, the last category is about regional resilience (Wilson, 2006; Campbell, 2006; Bristow & Healy, 2020), which has a strong economic flavour and dimension. All the above categories of the literature are very much aligned to the tourism spatial planning scales, following the logic of the destination scales that were presented in Section 2.

Considering the above, it becomes evident that the integration of resilience into tourism spatial planning needs to take place at all planning scales (as identified above), and according to the type of destination (i.e., local and regional tourism poles and zones). In the following section, the paper articulates spatial policy and planning guidelines and recommendations, with a two-fold objective: how to mitigate the impacts of climate change on tourism destinations and how to minimise the contribution of tourism destinations to climate change acceleration.

5. Spatial Planning for Tourism Destinations Resilient to Climate Change

5.1. Spatial Planning Guidelines at the Local Level

Starting from the building scale (i.e., the design of facilities and infrastructure), the guidelines articulated in this section are mainly categorised into two types: those for urbanised tourism settings and those for rural tourism settings, including protected areas of natural (and cultural) heritage.

Tourism facilities and infrastructure: By tourism facilities and infrastructure, one mainly refers to accommodation (resorts, hotels, etc.), and other tourism infrastructure (conference halls, marinas, etc.). As documented in Section 3.2, among those, the construction of accommodation is considered a high contributor to GHG emissions and water consumption (UNEP, 2021; UN, 2021; Scott et al., 2016). Water consumption is also related to the maintenance of certain tourism infrastructure (Williams & Shaw, 2009; Gössling et al., 2012b; Hadjikakou et al., 2012), such as golf courts, etc. Having this in mind, it is important that the design of these constructions adapts to the local climate conditions, to ensure thermal comfort, which by extension will ensure a reduction in energy consumption and in GHG emissions at the building scale. Apart from bioclimatic design, fighting climate change is also achieved by making tourism facilities and infrastructure energy-efficient, mainly using renewable energy sources (Khozaei et al., 2022). In line with the above, as tourism buildings and infrastructure tend to occupy sensitive ecosystems and sites of unique natural and cultural beauty, it is important that building restrictions respect the landscape and building tradition of the destination.

Lastly, tourism facilities and infrastructure must become resilient to natural disasters (e.g., fires, floods) that take place because of climate change. According to Wamsler et al. (2013), the design should aim at reducing the vulnerability of buildings and infrastructure to disasters deriving from climate change. In addition, as research conducted in 12 European countries most frequently affected by natural disasters proved, hotel managers more

and more anticipate such situations; therefore, they adapt their plans to ensure business sustainability (Ivkov et al., 2019).

Urbanised tourism settings: In urban planning, the "adaptation turn" to climate change goes back to the beginning of the 2000s (Davoudi et al., 2009). Urban settings that constitute tourism poles usually regard cities, second home areas, tourist villages, large-scale resorts, etc. According to the existing literature, in these types of settings, planning measures and guidelines should aim at adapting to—and mitigating—climate change and managing and preventing natural disasters. The aim is also to create low-carbon cities, which will produce less emission and lessen climate change acceleration (Beriatos & Papageorgiou, 2011; Vettorato et al., 2011).

According to Wamsler et al. (2013), planning in urban settings should include physical interventions to reduce exposure of the built environment to hazards. Urban planning should also promote technical (and grey) infrastructure (e.g., dikes, sewerage and drainage systems, etc.) to mitigate the impacts of natural disasters, and also green and blue infrastructure (e.g., open water channels, retention ponds) that will also fight biodiversity loss and provide more protection to the urban fabric (Wamsler et al., 2013; Papageorgiou & Gemenetzi, 2018). In addition, research conducted in eight European medium-sized cities (Terkenli et al., 2020) proved that green infrastructure (and especially that found close to urban cultural heritage sites) has an indirect possibility of being included in the tourists' visiting plans, and may also serve as places for light physical activity, relaxation, and socialisation.

Moreover, land-use planning and building restrictions in urban settings may also contribute to climate change adaptation (Berke & Stevens, 2016). Adopting measures to control population and building densities, to prevent uncontrolled urban sprawl, and to protect urban and peri-urban green spaces is critical (Perini et al., 2017; Lu et al., 2020). In some cases, it might be necessary to relocate crucial infrastructure serving not only the general public but also tourists (e.g., hospitals, transport infrastructure, cultural buildings) to more secure areas (Wamsler et al., 2013). Selected public spaces of tourism importance might also need to undergo bioclimatic design to ensure comfortable conditions as much as possible, depending on the local climate.

Apart from that, another essential measure for urbanised tourism areas relates to transport and mobility. The implementation of an alternative mobility approach and sustainable transportation planning is imperative. As argued by Trombino and Trono (2020), inefficient urban transport is responsible for reducing air quality and increasing CO_2 emissions. As a result, this degradation and deterioration of the urban ecosystem's integrity result in damages to urban tourism destinations.

Lastly, managing the energy demand and changing the energy supply model in urbanised tourism poles are equally important. A large part of primary energy demand and emissions worldwide takes place in urbanised areas, making renewable energy sources very essential in the view of promoting sustainable and resilient cities (Vettorato et al., 2011).

Rural tourism settings: Rural settings are usually rich in natural and cultural resources as well as other tourism attractions (e.g., settlements, thematic parks, cultural sites) and thus receive important tourism flows. In the existing literature, the adaptation of rural areas to climate change has been mainly addressed in relation to biodiversity loss (Habibullah et al., 2022; Weiskopf et al., 2020). The maintenance of valuable ecosystems (e.g., forests) and ecosystem services is considered central in building resilience against climate change. A mountainous zone is often the focus in this literature, as it hosts vulnerable ecosystems (Lindner et al., 2010). Emphasis in the literature has also been given to the identification and mitigation of the impacts of climate change on natural and cultural protected areas that constitute valuable tourism resources (Thomas & Gillingham, 2015; Melillo et al., 2016).

Another important (rural) tourism resource is a coastal zone. Coastal zones are magnets for tourism flows and tourism facilities and infrastructure, often leading to an excess of the carrying capacity of ecosystems (Tang et al., 2022). Moreover, these zones are more vulnerable to the effects of climate change and the acceleration of natural processes such as coastal erosion (Pang et al., 2023). Rural tourism settings, in the mountainous zone, on the other hand, are threatened by extreme weather events, temperature rise, and other phenomena deriving from climate change (Lindner et al., 2010). Therefore, apart from protecting the ecosystems, it is also imperative that planning addresses issues of the adaptation of mountainous tourism destinations, settlements, and infrastructure to withstand climate change.

In all the above types of settings, wise land-use planning is necessary to protect the vulnerable rural areas (such as the peri-urban zone, the coastal zone, natural parks, etc.), which are susceptible to desertification phenomena, soil sealing, and unnecessary land-take, which are responsible for biodiversity loss and for climate change acceleration (Perini et al., 2017; Lu et al., 2020). By implementing wise land-use planning, and by developing environmental infrastructure, rural settings (and the tourism facilities and infrastructure found within) are also protected from extreme weather phenomena, as well as from natural disasters that may occur due to climate change. Last, but not least, and as in all other cases, it is also important that planning addresses the protection of rural settings over natural disasters.

5.2. Spatial Planning Policies and Guidelines at the Strategic/Regional Level

Spatial planning at the regional level is mainly strategic, shaping development guidelines and implementing spatial patterns relevant to the profile of the region (Albrechts, 2010). At this level, spatial planning (cross-cutting or exclusively for the tourism sector) is responsible for organising tourism poles and zones, as well as developing infrastructure and resources that are vital for tourism development (Gunn, 1988; WTO, 1994/1997; Var & Gunn, 2020). Having this in mind, a key objective of spatial planning should be polycentricity (Davoudi, 2003). In the case of tourism, this means promoting poles and zones of diversified size and range (Inskeep, 1991). Although the contribution of this concept in spatial planning has been questioned lately (Dadashpoor et al., 2023), and it has not been correlated in the literature with climate change, it is expected that promoting polycentricity will mitigate climate change acceleration. Polycentricity is also ideal in the cases of tourism destinations with a linear structure/development (e.g., in the coastal zone). It also works as an antidote for destinations undergoing an overconcentration of tourist flows and facing problems of carrying capacity (Tang et al., 2022).

At this scale, it is of paramount importance that spatial planning incorporates a risk analysis and vulnerability assessments (Theodora & Stratigea, 2021; Schmidt-Thomé, 2006), to identify potential areas non-qualified for tourism development, because of threats, hazards, and the natural disasters associated with climate change. These assessments will also make it possible to indicate interventions regarding technical constructions and environmental infrastructure to mitigate the impacts of hazards and disastersIt will also make it possible to promote special measures to mitigate climate change impacts in sensitive areas (such as the coastal and the mountainous zones) (Buckley, 1999; Boavida-Portugal et al., 2016).

Going a step further, regional spatial planning for tourism development resilient to climate change also needs to adapt to national and international policies related—directly or indirectly—to climate change (Sarantakou, 2022). Those directly related to climate change mainly aim at promoting low-carbon cities and regions (Davoudi et al., 2009; The World Bank & DNV KEMA Energy & Sustainability, 2014). Other very relevant policies

supporting the transition to a state of net-zero emissions focus on the sectors of energy and transportation. In the case of the UN and the EU, such policies and initiatives regard the Climate Action, the EU Green Deal, etc. Of great relevance as well are policies related to the environment/nature and, more specifically, to biodiversity loss and water resources (e.g., the UN Convention on the Biological Diversity, the EU Water Framework Directive, etc.).

Lastly, minimising the contribution of the tourism sector to climate change is closely related to the tourism model chosen for a region or a large-scale tourism destination. To this purpose, it is very important to promote sustainable and responsible tourism, favouring eco-friendly and nature-based practises. Sustainable and responsible tourism is also key in respecting regions of natural, cultural, and social capital and large-scale destinations (Scott, 2021; Cheer et al., 2021). This tourism model should also be properly adapted to the future climatic conditions of each region. For example, mountainous regions as well as winter destinations and ski resorts that are expected to experience a rise in temperature and a loss of snowfall should plan in advance the shift to a new tourism development model, in order to maintain their competitiveness as tourism destinations.

6. Conclusions

In the era of climate change, tourism destinations and all places offering tourism activities are increasingly exposed to unpredictable processes and to sudden and slow changes. This means that sooner or later, all tourist destinations will be forced to integrate resilience in their strategies and plans, to mitigate the impacts and the risks associated with climate change.

The role of spatial planning in achieving resilient tourism destinations is crucial, as it is a flexible process in terms of scale while it also has a clearly proactive role. Integrating resilience in tourism spatial planning is more than necessary not only for creating tourism destinations robust enough to withstand climate change effects, but also for addressing perturbations and losses that occur because of climate change, as well as for lessening the contribution of uncontrolled tourism growth to climate change acceleration.

Having this objective, spatial planning needs to integrate all policy targets related to climate change and especially those addressing GHG emissions (as tourism is highly contributing to GHG releases). Then, it also needs to address challenges related to natural disasters and natural processes that are expected to take place more frequently as a result of climate change. In practical terms, a key objective for spatial tourism planning should be the integration of a risk analysis and assessment. Risk assessment should emphasise disasters and threats that are relevant and more frequent in each tourism destination.

Considering the above, future research can become more state-specific, taking into consideration the national spatial planning system, and provide recommendations on how the specifications for spatial tourism planning integrate the risk analysis and vulnerability assessment of tourism destinations.

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