

Chapter 4

Is the Tourism Perspective Envisaged in Climate Change Adaptation Planning?



Evaluating the Road Map of Political, Social and Environmental Dimension in Spanish Destinations

Carmen Mínguez and Sandra Ricart

Abstract Climate change is one of the main challenges for today's society due to the increase of extreme event frequency and severity, demanding policy actions and coordination to mitigate their impacts. This contribution analyzes to what extent tourism activity is considered in the Spanish National Plan for Adaptation to Climate Change 2021–2030 (PNACC) and the local strategies, which measures are considered to reinforce the tourism industry adaptive capacity, and how coherent tourist cities' plans for climate change adaptation are. To this end, the following research questions are posed: (1) What actions are promoted, and how do they aim to face climate change? (2) Is the type of tourist destination a driving factor conditioning actions design? (3) What is the balance between public and private responsibilities and actions when reducing the tourism industry's vulnerability? We evaluate the top-ten Spanish tourist cities by applying the triple-loop approach to delve into the political, social, and environmental dimensions of climate change adaptation together with testing policy coherence standards. The findings reported that most plans are framed in a multi-focal adaptation strategy, in which the focus on the tourism industry can be explicit or implicit while distinguishing between actions carried out by tourist cities and cities with tourists. Interestingly, bottom-up approaches are promoted to collect citizens' perspectives regarding climate change, sometimes including tourists as end-users. Furthermore, the policy coherence test pointed out the need to strengthen

C. Mínguez (✉)

Tourism, heritage and development research group, Department of Geography, Complutense University of Madrid, University of Madrid, Madrid, Spain
e-mail: cminguez@ghis.ucm.es

S. Ricart

Water and Territory Research Group, Interuniversity Institute of Geography, University of Alicante, San Vicente del Raspeig, Spain

Environmental Intelligence for Global Change Lab, Department of Electronics, Information and Bioengineering, Politecnico di Milano, Milan, Italy

S. Ricart

e-mail: sandra.ricart@ua.es

the attention to tourism-related measures and a more pro-active engagement of the tourism industry to motivate accurate and robust actions in the medium and long terms.

Keywords Climate change · Tourism · Cities · Adaptation plan · Coherence policy · Resilience · Causal-loop diagram

Introduction

The knowledge of tourism and climate change has expanded considerably, reflecting the growing interest, evidence, and concern related to the role of tourism in global environmental change, both as a contributor and as a recipient of impacts. The climate–tourism nexus has been studied since the 1960s, and it is now firmly established that the attractiveness of a prospective destination is influenced by different variables, including people’s mental representations of the weather, that is, the psychological representation of the weather, as an important factor in tourism demand and holiday decision-making, including travel motivations, destination choice, and the timing of travel (Ngxongo, 2021; Njoroge, 2015). Tourism can be considered a high climate- and weather-sensitive economic sector because climate and weather are considered among the most valuable natural resources in tourism development (Franzoni & Pelizzari, 2019). The literature provides a comprehensive understanding of the changing climate’s direct and indirect impacts on continental and island contexts, including changes in the atmosphere, the ocean’s physical parameters, and changes in extreme event patterns.

The evidence is that climate change already affects tourism regionally through diverse impacts on natural and cultural heritage and changes in demand patterns (Scott & Gössling, 2022). Climate change also affects several ecosystem services benefiting tourism (Cheer & Lew, 2017). Depending on location and topography, heavy rainfall events, including storms and floods, can decrease tourist stays in the short run (Kostianaia & Kostianoy, 2021). Rising sea levels and other environmental issues in coastal areas can reduce beach availability and trigger environmental and social change without historical parallel (Yong, 2021). More frequent and severe heatwaves could affect tourism demand and expenditure, reducing thermal comfort, intensifying the heat island effect, and therefore, conditioning the value of the recreational experience at the destination (Huang et al., 2019). These impacts will transform tourism’s competitiveness, sustainability, and spatial distribution, increasing the tourism industry’s vulnerability and related social systems (Scott et al., 2019).

According to the last estimations by the Department of Economic and Social Affairs of the United Nations, the global share of the urban population is projected to rise further to 60% by 2030, and 40% of the global population is estimated to be living in cities with at least half of million inhabitants. As vibrant epicenters of culture and commerce, some of the world’s greatest tourist destinations are cities, which attract a growing number of visitors yearly (Bock, 2015). Cities are key elements

that contribute to global low-carbon development, promote the implementation of global sustainable development goals (SDGs), and implement New Urban Agenda actions (NUA) (Hachaichi, 2022). Globally, cities have emerged as leading climate change adaptation and mitigation actors, reflecting a shift toward a more bottom-up approach to climate action and the unique capacities of urban policymakers to implement climate policies (Jiricka-Purrer et al., 2020). To date, more than 12,000 cities on every continent (excluding Antarctica), representing about 12% of the global population, have signed the Global Covenant of Mayors for Climate and Energy to set greenhouse gas (GHG) emissions reduction targets for their local territories.

Furthermore, cities play a crucial role in global climate change governance in three ways (Castán Broto, 2017): Firstly, cities support learning and exchange processes between local governments and other subnational organizations. Secondly, they gather local resources and knowledge to implement specific schemes. Thirdly, by raising the profile of cities in international agendas, they evoke the interest of political and business actors (including the tourism industry). However, debates on cities facing climate change require, first, recognition of the role of local governments and municipalities alongside other forms of state-control; and second, a turn of attention toward the multiple actors that intervene directly or through hybrid arrangements in urban governance, including the business sector, public–private partnerships, civil society organizations and community groups, and other diverse networks of actors who routinely change urban trajectories (Lopes et al., 2022). Understanding local-level responses to change is crucial in preparing the tourism industry, the communities, and policymakers to be responsive to change (Kajan & Saarinen, 2013).

Despite the differential impacts of climate change, tourism destinations must adapt to climate change, whether to manage risks or to capitalize on new opportunities associated with impacts on regional or global competitors (Scott, 2021). The tourism industry at the urban level tends to prefer applying different mitigation strategies, using voluntary, regulatory, and economic instruments that target different stakeholder groups. Voluntary instruments, such as strategic commitments by companies and/or tourist destinations—endorsed or not by official bodies—to combat climate change have been increasingly widespread as codes of conduct, good practice guides, eco-labels, or certifications or environmental management systems (Gómez-Martín, 2017). From an institutional perspective, considering climate change in tourism policy represents a considerable shift, given that traditionally, the objective pursued by Tourism Ministries and Bureaus was to grow tourism, increase revenue, and maximize economic benefits (Joppe, 2018). As Schweinsberg and Darcy (2022) pointed out, prioritizing different areas of intervention is a central question for managing and governance of climate change in urban areas attending to public and private roles and interests. To excel in this issue, cities must design and implement local climate plans, that is, planning documents prepared at the city level that contain policies relevant to climate change adaptation and/or mitigation for different activities, including tourism (Grafakos et al., 2020).

Numerous actions have been taken to address climate change in built environments, such as cities, including adaptation plans to define actions that lead to the

abatement or reduction of vulnerability to climate change and mitigation plans to encompass actions that entail a reduction in greenhouse gas emissions. Most of them focused primarily on either adaptation or mitigation actions, but there has been limited action to integrate both adaptation and mitigation to define the political, social, and environmental dimensions of the action against climate change (Becken et al., 2020). The division between climate change adaptation and mitigation and the potential conflicts that can emerge between the two have shaped debates about what kind of action is most appropriate and hindered the development of transversal action (Boyd et al., 2022). However, although only a minority of cities' action plans considered climate policies and even fewer implement integrated adaptation and mitigation plans, some studies provided examples of cities taking measures toward a more integrated approach in climate change planning (Reckien et al., 2018). According to Lin et al. (2021), adaptation measures integrating technological, nature-based, and social solutions can provide multiple co-benefits to address complex socio-ecological issues in tourism cities while increasing resilience to potential climate change impacts.

Although an analysis of climate change policies has occurred (Iwami et al., 2020), there is limited attention to the coverage of climate change actions in urban planning adaptation plans and, more specifically, to the relevance of tourism actions in city strategies to face climate change. Therefore, it is *sine qua non* to assess and analyze the content of the adaptation strategies and plans from a tourism industry's perspective. Specifically, previous studies corroborate the paucity of tourism work that addresses mitigation and adaptation holistically and suggest that the tourism sector applies a short-term decision-making framework that relies on action strategies rather than planning. This study represents a breakthrough in the study of climate change and tourism, as it develops a comprehensive climate risk framework specific to tourism. Its novelty lies in the fact that it seeks to explore and compare the approaches set out in cities' adaptation plans to provide insights into the adoption of adaptation strategies. This employs a qualitative methodology and is based on the triple-loop approach in terms of political, social, and environmental dimensions. This approach brings originality to the work by allowing the exploration and comparison of strategies established in urban adaptation plans to check if they are strategically planned considering the exposure of tourism to the impacts of climate change. To this end, we analyze secondary data from the available information at the local scale to answer the following research questions: (1) What actions are promoted and how do they aim to address climate change? (2) Is the type of tourism destination a driving factor conditioning the design of actions? (3) What is the balance between public and private responsibilities and actions in reducing the vulnerability of the tourism industry?

This chapter is divided into five sections. After this introduction, in Sect. 2 we present The Spanish National Climate Change Adaptation Plan (PNACC), the framework for action in Spain. In Sect. 3, we define the study areas and describe the data used and the indices applied for their analysis. The results are presented in Sect. 4, differentiating each of the three dimensions addressed. Finally, Sect. 5 contains the discussion and the main conclusions.

The Spanish National Climate Change Adaptation Plan 2021–2030 (PNACC)

The Spanish National Climate Change Adaptation Plan (PNACC) is the reference framework for coordinating the Public Administrations in impact assessment, vulnerability studies, and adaptation to climate change in Spain. This document replaces an earlier version published in 2006 and spanning 2006–2020. The current strategy for 2021–2030 was approved in September 2020 and considers a series of ecological systems and socio-economic sectors for impact assessment, vulnerability studies, and adaptation to climate change, including tourism. The plan aims to facilitate and provide continuous assistance to the interested administrations and organizations—public and private, at all levels—to evaluate the impacts of climate change and the system's adaptive capacity.

The plan includes a set of strategies aimed at avoiding or reducing the impacts of climate change, as well as improving the perception of the recovery of damages. According to the National Plan, which combines adaptation and mitigation issues, the autonomous communities have developed their strategic frameworks, plans, and/or programs on adaptation to climate change. These are developed through initiatives and actions, sometimes even reinforcing the legal framework on climate change. In addition, most of the large Spanish cities have approved their plans to locally face climate change, although these do not constitute a reproduction of the National Plan at the local level.

The current edition of the PNACC 2021–2030 includes, as a novelty compared to the first edition, the definition of a series of strategic objectives by sectors and a system of indicators. In addition, the number of topics addressed and the number of involved stakeholders have increased. Specifically, the plan contemplates the impact of climate change on the tourism sector, affecting four key aspects: tourism resources, tourism infrastructure, tourism supply, and tourism demand. Due to the physical characteristics of the destinations, those located on the coast or in high mountain areas are considered especially sensitive. The plan also provides an overview of the most frequent and relevant climate risks in tourist destinations:

- Increase in temperatures and heat waves, especially during the summer, coincides with the high tourism season in Spain. This fact is especially relevant for cities along the Mediterranean coast due to the increase in seawater temperature, which may affect the climatic comfort of visitors.
- Changes in rainfall patterns, droughts, and floods. A decreased or erratic precipitation supply, especially in summer and southern areas, combined with warmer temperatures, affects the water resources supply for certain tourist and recreational activities (e.g., swimming pool, landscaping).
- Rising sea level affects the tourist resources and infrastructures on the coast, but also alters the attractive sea–sand–sun products and puts at risk the highly valued tourism hotspots with economies heavily dependent on the travel sector.

The objectives of the plan related to the tourism sector consist of (i) integrating adaptation to climate change into plans, programs, and strategies in the field of tourism, including the Sustainable Tourism Strategy of Spain 2030; (ii) protecting tourist destinations and resources and promoting the resilience of infrastructures and equipment for tourist use; (iii) define tourism models that are sustainable and take into account the environmental load capacities and climatic conditions of the destinations, and iv) stimulate supply and demand for a tourism offer that combines a good adjustment to the new climatic conditions and a low-carbon footprint.

Materials and Methods

The literature suggested a more systemic approach to inform cost-effective and socially appropriate government and private sector investment in adaptation from a tourism sector perspective (Loehr, 2020). However, there is still limited understanding of what constitutes holistic, destination-wide, climate risk reduction and how different destination elements interact and influence climate risk and resilience in tourism cities (Jopp et al., 2010). A recent review by Loehr and Becken (2021) corroborates the small number of tourism studies that address mitigation and adaptation holistically, combining and complementing methodologies and approaches to comprehensively understand trade-offs, not just between different interventions or policy goals, but also between stakeholders and system elements. Furthermore, previous studies suggest that the tourism industry applies a short-term decision-making frame that relies heavily on ‘climate coping strategies’ rather than future-oriented planning, which makes innovative and transformation analysis frameworks more urgent than ever (Weaver et al., 2022).

The present study develops a comprehensive tourism-specific climate risk framework. It adopts the policy coherence for development (PCD) approach to reinforce system analysis and provide an analytical lens to understand the motivations, measures, and implementations geared toward integrating the tourism sector in climate change adaptation policies. The PCD framework considers four aspects through which coherence can be measured: (1) motivation for policies/strategies/plans, (2) action measures, (3) implementation and resources, and (4) monitoring and evaluation, including stakeholders’ engagement (Ahmed et al., 2022). This framework will be included in an evidence-based analysis of the main driving factors considered when addressing climate change adaptation from a tourism perspective. In practice, this means scaling up experiences (identified as case studies), and learning from a triple-loop approach (political, social, and environmental dimensions), while identifying main actions and expected results and highlighting potential weaknesses and barriers to adaptation combined with new knowledge exchange from local sensitivities.

Three research questions are formulated:

- (1) What adaptation actions are promoted, and how do they aim to face climate change to reinforce tourism resilience?
- (2) Is the type of tourist destination a driving factor that differentiates or conditioning the designed actions?
- (3) What is the balance between public and private responsibilities and the actions developed to reduce the vulnerability of the tourism sector?

Data Collection

This research follows the statement by Vale (2014) and Landauer et al. (2019), according to which climate change resilience should be assessed at the local scale, being aware that actions tend to be initiated by different jurisdictions and administrations and steered by various rules, laws, and regulations to finally converge and interact (e.g., at the city level). Consequently, and in the absence of similar studies carried out in Spain, we evaluate the coverage of climate change actions in the plans and strategies developed by the ten most visited Spanish cities in 2022. Our aim is to deepen their capacity to increase resilience to impacts of climate change from a tourism perspective, filling a research gap.

Cities were selected based on official data from national and international travelers offered by the Hotel Occupancy Survey of the Spanish National Institute of Statistics. This source collects information at the municipal level for the main Spanish destinations. The number of travelers has been considered a criterion for the selection to represent the volume of tourism activity while offering a diverse dimension in terms of destination typology (i.e., other variables, such as overnight stays, tend to overestimate the coastal destinations where the stay is more prolonged). Local-level adaptation planning documents available on municipalities' websites were collected for each selected city, as key secondary sources. This documented public material is the best available information that can be used for comparative purposes, avoiding subjective self-reported information by governments.

Table 4.1 includes the locations used in the analysis, detailing the number of annual visitors, the name of the strategy or plan developed and the year of approval, and the main climate risks to be faced.

Data Analysis

The analysis aims not to compare the case studies per se but to consider the selected case studies as frontrunners in the Spanish and European contexts. Instead, we deepen the relative importance of the resilience of tourist cities based on the advantages and challenges ascribed from climate change adaptation strategies and plans to explore how they can be translated into practical effects (Madsen & Hansen, 2018). First, an evaluation matrix was used to detail a set of criteria to characterize each dimension of

Table 4.1 Characterization of selected local experiences as tourist cities

City	Visitors (in million)	Strategy/plan	Year
Madrid	8.6	<i>Hoja de Ruta hacia la neutralidad climática en 2050</i> [roadmap toward climate neutrality in 2050]	2019 (updated in 2022)
Barcelona	7.4	<i>Plan de Acción por la Emergencia climática 2030</i> [Action Plan for the Climate Emergency 2030]	2021
Sevilla	2.6	<i>Plan de acción por el clima y la energía sostenibles</i> [action plan for sustainable climate and energy]	2017
Palma (Balearic Islands)	2.4	<i>Pla d'Acció per Clima i l'Energia Sostenible de Palma</i> [Action Plan for Climate and Sustainable Energy of Palma]	2022
Benidorm	2.0	<i>Plan de adaptación ante el cambio climático de Benidorm</i> [Benidorm climate change adaptation plan]	2021
Valencia	1.9	<i>Plan de acción medioambiental del Municipio de Valencia</i> [environmental action plan of the Municipality of Valencia]	2020
San Bartolomé de Tirajana (Canary Islands)	1.6	<i>Plan de Acción por el Clima y la Energía Sostenible</i> [Action Plan for Climate and Sustainable Energy]	2021
Calvià (Balearic Islands)	1.6	<i>Plan de Acción para el Clima y la Energía Sostenible de Calvià</i> [Calvià Climate and Sustainable Energy Action Plan]	2020
Adeje (Canary Islands)	1.5	<i>Plan estratégico local contra el cambio climático</i> [local strategic plan against climate change]	2019
Málaga	1.3	<i>Alicia. Plan del clima de Málaga</i> [Alicia. Malaga climate plan]	2021

Note The scale of intervention is local for each case study and has been developed by the City Hall. Data on visitors for 2022 according to the Spanish National Institute of Statistics. 'Climate variability' was characterized according to Arabadzhyan et al. (2021). Granada is ranked 8th but has not yet defined a strategy plan for climate change adaptation

Source Authors' own elaboration

the triple-loop approach on the urban scale and evaluate their relevance in integrating mitigation and adaptation actions (Hurlimann et al., 2021). Each dimension has been conceptualized from desktop research and described by adopting similar methods (Ricart et al., 2022; Serra et al., 2022). Following similar studies (Ledda et al., 2021), we used unweighted criteria to outline each dimension (i.e., we assigned the criteria the same weight).

Therefore, each dimension has been described using components and indicators. A total of 12 components and 37 indicators have been used to delve into cities' adaptation plans (Fig. 4.1). Consequently, the political dimension was analyzed through

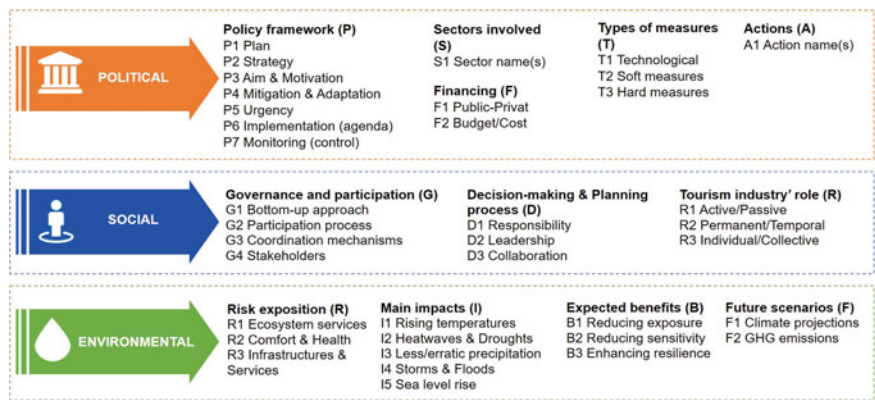


Fig. 4.1 Triple-loop approach detailing the political, social, and environmental dimensions, components, and indicators. *Source* Authors' own elaboration

14 indicators organized in five components: policy framework, sectors involved, type of measures, actions, and financing; the social dimension was analyzed through 10 indicators organized in three components: governance and participation, decision-making and planning processes, and role of the tourism industry; and finally the environmental dimension was analyzed through 13 indicators organized in four components: risk exposure, main impacts, expected benefits, and future scenarios.

Then, we examined the policy coherence between climate change adaptation requirements and focus on tourism actions according to the content of the adaptation plans. Policy coherence has emerged as a prominent concept in the debates surrounding sustainable development and adaptation, that is, the extent to which the institutional structure fosters coherent and coordinated policy-making and implementation (Glass & Newig, 2019). Different conceptual frameworks have been developed to measure policy coherence: It can be undertaken vertically and horizontally. The former refers to coherence between different levels of government, while the latter refers to coherence between policy areas and subjects (Kelleher et al., 2019). We opted to apply the second approach to explore if and how the tourism area reinforces policy actions across government departments and agencies, creating synergies toward climate change adaptation. Different coherence factors are considered: motivation, measures, implementation and resources, and monitoring and evaluation (Table 4.2). Each factor includes different variables that will be evaluated depending on whether they are explicit (E), implicit (I), or not mentioned (NM). Then, a specific score method similar to that applied by Olazabal and Ruiz de Gopegui (2021) was considered to translate qualitative into quantitative data by defining for each metric the following punctuations: explicit (1 point), implicit (0.5 points), and not mentioned (0 points).

Table 4.2 Factors for policy coherence analysis

Factor	Variable
Motivation	Observed climate change trends
	Projected climate change impacts
Measures	Tourism related
	Pro-active management
Implementation and resources	Institutional set-up
	Responsibilities
	Financial
	Supporting areas
Monitoring and evaluation	Implementation follow-ups
	Reporting

Source Adapted from Ranabhat et al. (2018)

Experiences

The selected case studies are located in six regions (Fig. 4.2), combining inland and coastal contexts and defining different typologies and motivations for tourism destinations. All of them are signatories of the Global Covenant of Mayors for Climate & Energy (GCoM), the largest global alliance for city climate leadership. Likewise, Madrid, Barcelona, Sevilla, and Valencia are members of CitiES 2030, a Spanish platform for promoting climate-neutral cities. Furthermore, Madrid and Barcelona take part of the ‘A list’ defined by the CDP not-for-profit charity to recognize the 122 cities across the globe leading environmental action, and the ‘C40 list’, a network of mayors of nearly 100 world-leading cities collaborating to deliver urgent action to confront the climate crisis.

Madrid, the capital of Spain, is considered one of the main tourist destinations in Europe since, in addition to housing the seat of government and state administration, it is home to the leading museums and the headquarters of numerous international companies, educational institutions, as well as meeting facilities. This rich and diverse offer makes it a significant cultural, leisure, shopping, meetings–incentives–conferences–exhibitions (MICE), and business destination. It also benefits from a highly centralized transportation network, which connects to all cities in the country and an international airport with direct connections to all European and American capitals.

Since the 1992 Olympic Games, Barcelona, the capital of the autonomous community of Catalonia, has become an international benchmark as a destination for a city break and MICE tourism. The consolidation of its port as the start and end of Mediterranean cruises, as well as low-cost flights and the presence of the urban beach, inferred the overtourism in the city. This process has been associated with social conflicts and the response of residents who see how their quality of life is reduced. In recent years, city council efforts have been focused on finding a balance.



Fig. 4.2 Case studies' location. *Source* INE for the map information and own elaboration and <https://procomun.intef.es> for the pictures

Sevilla is a monumental city and the capital of the autonomous community of Andalusia. The city is well recognized for its cultural attraction and leisure offers. In the years prior to COVID-19, tourist activity experienced a strong growth manifested in the expansion of the city's tourist area, affecting popular neighborhoods. The impacts of touristization are manifested in the proliferation of tourist rental housing, the replacement of traditional businesses with others oriented to tourist demand, and the rapid increase in residential rentals. These factors have led to population expulsion and even a thematization of specific areas.

Palma has been an important tourist destination since the beginning of the twentieth century, and since the 1960s, it has consolidated its position as a mass destination. Its cultural, leisure, and shopping offer is complemented by the sun and the beach, the island's main attraction. Its historic center has experienced since the 1990s an intense process of gentrification, which has driven out residents and businesses. In

recent decades, this process has increased foreign capital investment and tourist pressure, especially in the housing market with the massive proliferation of Airbnb. As in Barcelona, the social response is strong and forces the administration to regulate in search of balance.

Benidorm, in the autonomous community of Valencia, is one of the main tourist destinations of the Costa Blanca, on the Mediterranean coast. It began to receive visitors in the nineteenth century, and in 1956 the City Council approved the urban planning designed to create a city for tourist leisure. Likewise, the Benidorm music festival promoted the city internationally. Since then, Benidorm has become a film set and has received international tourists attracted by its beaches and nightlife. It remains active during the winter thanks to the IMSERSO social program to promote national tourism mobility. It is the third city with the most hotel rooms in Spain and the first to receive the Smart Tourist Destination certificate.

Valencia is a medium-sized city, the capital of the Autonomous Community of Valencia. During the twentieth century, it was consolidated as an urban destination, especially for domestic tourism. In recent decades, due to improvements in accessibility, it has experienced a significant increase in tourist activity and, consequently, the touristization of its historic center. Since the late 1990s, the city has diversified its offer, with the construction of the City of Arts and Sciences and later with the renovation of the marina to host America's Cup in 2007, as well as numerous facilities that make it an essential destination for sports tourism, internationally recognized.

San Bartolomé de Tirajana is one of the municipalities of southern Gran Canaria Island. Since the early 1960s, the city has progressively exemplified the replacement of the dominant role of agricultural activity for the nascent tourism industry, especially with the introduction of sun and beach products in coastal areas. Tourism activity transformed the territory, which has artificialized the main natural areas to regenerate beaches, promenades, breakwaters, etc., adding the construction of much of the coastal strip to offer the related accommodations.

Calvià is a municipality located next to the Sierra de la Tramontana Mountain range and on the Mediterranean coast, on the island of Mallorca. After Palma, it is the second municipality in the number of inhabitants of the Balearic archipelago. It is made up of several population centers defined after the tourist and urban development of the twentieth century. It has a wide and diverse offer of accommodations, ranging from coastal hotels to rural houses, an important second-home offer, and sports facilities (ports, golf courses, tennis academies, and hiking areas, among others).

Adeje is located in the south of Tenerife, one of the seven islands of the volcanic origin of the Canary archipelago, located in the Atlantic Ocean. The tourism development of the island has been based on the sun and beach product, particularly intense in the southern tourist area (Arona-Los Cristianos/Adeje-Las Américas), where mass tourism generates environmental and territorial impacts.

Málaga, in the autonomous community of Andalusia, is an urban destination with a cosmopolitan vocation. Visitors are attracted by the cultural, gastronomic, and leisure potential of the city, as well as by its weather conditions and proximity to beaches. These, together with improvements in accessibility and investments in culture, have led the city to experience strong growth and tourist transformation of

tourists in a short period. This process has significantly impacted the historic center, which has suffered an increase in visitors and tourist accommodations, as well as the alteration of traditional activities and functions.

Results

The Triple-Loop Approach

The Political Dimension

The selected projects have been developed as part of a strategy specific to the urban area (e.g., Madrid, Palma, San Bartolomé de Tirajana, Málaga), even framed in a more far-reaching adaptation policy framework (e.g., Barcelona, Sevilla, Adeje). Plans include both mitigation (preventing or reducing the emission of GHG) and adaptation (anticipating the adverse effects to prevent or minimize the damage) actions to be developed in a time frame from 2030 (e.g., Adeje, Calvià) to 2050 (e.g., Madrid, Palma). However, some plans do not specify the period able to accomplish the targeted goals (e.g., Valencia). Although only half of the plans explicitly recognize the urgency for action (e.g., Madrid, Barcelona, Sevilla, Palma, and Málaga), most of them provide an implementation agenda, either in a schedule form (e.g., Barcelona, Benidorm), according to different scenarios at the short, medium, and long term (e.g., Madrid, Palma, Valencia), or providing a start and end date for each action (e.g., San Bartolomé de Tirajana, Calvià, Adeje). Likewise, they all count for monitoring indicators; some fix milestones (Palma, Valencia, Málaga) or priority levels (Benidorm).

Tourism is explicitly mentioned in most of the plans as one of the priority activity sectors in which to promote mitigation and adaptation measures (Sevilla, Palma, Benidorm, San Bartolomé de Tirajana, Calvià), while in other city plans, tourism is included in a more general description of the tertiary sector or service activities (Madrid, Barcelona, Valencia). Thus, there are two approaches to climate change intervention from a tourism perspective: a 'tourist city' or a 'city with tourists'. Interestingly, plans differ in the type of measures and actions promoted to reduce the vulnerability of cities to climate change (Table 4.3). All cities are committed to a change in climate culture, although with different ideological approaches. Thus, while Madrid bets on a modal change focused on private mobility, Barcelona advocates for a change in the economic development and natural resource consumption models. For this purpose, they all combine technological measures (promoting innovation to reduce vulnerability) with hard measures (enhancing the construction of physical infrastructure and/or the improvements to the existing infrastructure) and soft measures (facilitating actions on policy, social change, management, and finance to increase awareness on climate change).

Table 4.3 Political dimension, components, and indicators in case studies

City	Main type of measures		
	Technological	Hard	Soft
Madrid	Water and energy savings and management Waste management Smart lighting Urban access regulations	Efficient energy systems at home, public spaces, and transport Renewable energy sources Green cover	Awareness campaigns Studies and plans Normative updates Coordination network
Barcelona	Water and energy savings and management Waste management Urban access regulations	Efficient energy systems at home, public spaces, and transport Green roofs in public buildings Green cover and shaded areas Renewable energy sources Charging stations	Climate finance Public energy trader Tax incentives Awareness campaigns Education and learning Studies and plans Normative updates and protocol review
Sevilla	Water and energy savings and management Waste management Smart lighting Urban access regulations	Efficient energy systems at home, public spaces, and transport Renewable energy sources Green cover and green connection Public fountains Charging stations	Tax incentives Informative website Education and learning Coordination agency
Palma	Water and energy savings and management Waste management Smart lighting Urban access regulations	Renewable energy sources Green cover	Audited financial statements Public energy trader Financial incentives Education and learning Awareness campaigns Normative updates
Benidorm	Water and energy savings and management Waste management	Green cover Desalination plant	Education and learning Studies and plans Awareness campaigns Normative updates Coordination agency
Valencia	Water and energy savings and management Waste management Smart lighting	Renewable energy sources Charging stations	Financial incentives Energy audits Awareness campaigns Education and learning Studies and plans Normative updates

(continued)

Table 4.3 (continued)

City	Main type of measures		
	Technological	Hard	Soft
San Bartolomé de Tirajana	Water and energy savings and management Smart lighting	Renewable energy sources Charging stations Cycling network Park and ride	Energy audits and certifications Financial incentives Studies and plans Awareness campaigns Education and learning Normative updates Smart mobility app
Calvià	Water and energy savings and management Waste management Smart lighting	Cycling network Renewable energy sources Charging stations	Energy audits and certifications Financial incentives Awareness campaigns Studies and plans Education and learning
Adeje	Water and energy savings and management Waste management Smart lighting	Renewable energy sources	Financial incentives Awareness campaigns Normative updates Studies and plans Coordination agency
Málaga	Water and energy savings and management Waste management	Green cover Cycling network	Normative updates Studies and plans Education and learning Financial incentives Awareness campaigns Energy audits Coordination agency Observatory

Source Authors' own elaboration

All cities promote technological measures to ensure water and energy savings and management while focusing on waste management (all except San Bartolomé de Tirajana), smart lighting (e.g., Valencia, San Bartolomé de Tirajana, Calvià, Adeje), and urban access regulations (Madrid, Barcelona, Sevilla, and Palma). Most cities support hard measures by introducing efficient energy systems at home, public spaces, and transport and expanding renewable energy sources. At the same time, complementary actions focus on reinforcing green cover (Madrid, Barcelona, Sevilla, Palma, Benidorm, and Málaga) or enhancing sustainable mobility by popularizing charging stations (e.g., Barcelona, Sevilla, Valencia) and enhancing the cycling network (San Bartolomé de Tirajana, Calvià, and Málaga). Regarding soft measures, cities highlight two common strategies: awareness-raising campaigns combined with education-learning programs and climate financing and incentives. Likewise, some cities opt for normative updates (e.g., Barcelona, Valencia, San Bartolomé de Tirajana) and coordination agencies (Sevilla, Benidorm, Adeje, and Málaga) or network (Madrid).

Most cities point out examples of actions related to the adaptive capacity of the tourism sector. For example, Sevilla aims to create shady public places that favor rest areas for tourists (and the inhabitants), while Palma and Valencia promote awareness campaigns for tourists. Benidorm encourages the implementation of environmental management systems in tourist accommodation, and San Bartolomé de Tirajana implements conservation and protection measures for the natural environment as a way of promoting sustainable tourism, similarly with the action of promoting constructive and functional recovery of the natural heritage for its enhancement and tourist use implemented in Adeje. This city also introduces support campaigns to the tourism sector to reduce GHG emissions or the creation of the Atlantic Tourism Laboratory as an innovation center to collect data on tourism development and behavior and rethink new ways of approaching the present and future dynamics of the sector. Regarding the cost of the actions, all cities except Madrid and Barcelona provide information about the cost of each action, specifying, in most cases, the public and/or private financing.

The Social Dimension

Most cities follow a bottom-up approach when planning adaptation actions, including different participation mechanisms (Table 4.4). For example, Madrid seeks a platform to stabilize collaboration frameworks taking advantage of the European initiative Climate-KIC to accelerate the transition to a zero-carbon and climate-resilient society, while Barcelona prefers the co-creation of multiple activities, workshops, and seminars. Sevilla develops thematic workshops to (1) publicize the causes and foreseeable consequences of climate change at the local level to increase citizens' awareness of the need to be prepared for possible impacts, (2) collect direct perceptions of the effects of climate change in the city from different social agents, and (3) jointly define the most appropriate adaptation measures to minimize exposure and vulnerability. Benidorm and Málaga propose a calendar of conferences to share advances in the actions and the dissemination of the annual monitoring report, and Palma emphasizes collecting citizen perception through a digital survey. Most of these actions are mainly coordinated internally through the different technical areas of the City Hall (Barcelona, Benidorm, Valencia, Calvià). However, some plans incorporate stakeholders into decisions to create public-private partnerships, including regional administrations (San Bartolomé de Tirajana), research institutions (Madrid, Sevilla, Adeje), corporations and companies (Málaga), and the public (Palma).

City Halls are leading responsibility in decision-making processes, in some cases, taking advantage of collaborations at the interdepartmental level (Madrid, Barcelona, Palma), counting with citizens (Valencia), or exchanging experiences with other municipalities and the tourism sector (Benidorm, Málaga). Regarding the role of the tourism sector in the climate change mitigation and adaptation process, we can distinguish between tourist cities, that is, cities with an active role in the definition and implementation of actions (Sevilla, Benidorm, San Bartolomé de Tirajana, Calvià, Adeje, and Málaga) and cities with tourists, that is, cities performing a secondary or

Table 4.4 Social dimension, components, and indicators in case studies

City	Governance and participation				Decision-making and planning			Tourism sector role		
	G1	G2	G3	G4	D1	D2	D3	R1	R2	R3
Madrid	✓	✓	✓	✓	CH	CH	✓	PA		CO
Barcelona	✓	✓	✓		CH	CH	✓	PA		CO
Sevilla	✓	✓	✓	✓	CH	CH		AC	PE	BO
Palma	✓	✓	✓	✓	CH	CH	✓	PA	TE	CO
Benidorm	✓	✓	✓		CH	CH	✓	AC	PE	CO
Valencia	✓	✓	✓	✓	CH	CH	✓	PA	TE	IN
San Bartolomé de Tirajana		✓	✓	✓	CH	CH		AC	PE	IN
Calvià	✓				CH	CH		AC	TE	IN
Adeje	✓	✓	✓	✓	CH	CH		AC	PE	BO
Málaga	✓	✓	✓	✓	CH	CH	✓	AC	PE	BO

Source Authors' own elaboration

Codes Legend G1 (bottom-up approach), G2 (participation process), G3 (coordination mechanisms), G4 (stakeholders); D1 (responsibility), D2 (leadership), D3 (collaboration); R1 (active or passive), R2 (permanent or temporal), R3 (individual or collective). Answers legend: CH (City Hall), PA (passive), AC (active), PE (permanent), TE (temporal), CO (collective), IN (individual), BO (both)

passive role in adaptation implementation (Madrid, Barcelona, Palma, and Valencia). Excluding Madrid and Barcelona, cities define their role in the adaptation agenda according to the level of involvement, which can be occasional (Palma, Valencia, Calvià) or permanent (Sevilla, Benidorm, San Bartolomé de Tirajana, Adeje, and Málaga), but also considering their capacity to cooperate in developing mitigation or adaptation actions. For example, by promoting changes in the urban planning and infrastructures that favor exclusively the tourist sector (e.g., Valencia, San Bartolomé de Tirajana, Calvià), the residents (e.g., Madrid, Barcelona), or both residents and tourists (e.g., Sevilla, Benidorm).

The Environmental Dimension

Cities are aware of their risk of exposure to climate change and agree to perceive the main impacts of extreme weather events. However, only some cities provide details on how exposure to risk affects ecosystem services, comfort and health, or infrastructures and services (Table 4.5). For example, cities such as Madrid, Sevilla, Benidorm, and Valencia recognize concerns about the effects on the river environment and biodiversity. At the same time, Adeje provides a more holistic plan by identifying ecosystem risks. In general, cities pinpoint health and comfort disturbances and alterations in infrastructures and services due to climate change scenarios. However,

they do not share details on managing risk exposure. There are two exceptions: San Bartolomé de Tirajana, which provides indicators related to the most vulnerable sectors, and Valencia, which promotes infrastructure adaptation to reduce the risk of proliferation of infectious vectors.

Cities notice main perceived impacts related to changes in temperature and precipitation patterns, such as rising temperatures, heatwaves and droughts, or less rainfall or erratic patterns, storms, and floods, in some cases inducing sea level rise. Plans tend not to regionalize these effects; a little background is transferred about local or particular damages. In some cases, experiences are shared through indicators of climatic threats (e.g., San Bartolomé de Tirajana). Likewise, plans contribute with observations about the expected benefits of applying the mitigation/adaptation plan in terms of reducing exposure (in some cases laying out the cost of inaction, e.g., Sevilla, Calvià) and sensitivity, for example, through communication campaigns (Madrid, Sevilla, Palma), green/climate entrepreneurship competitions and a training plan for young people (Benidorm) and together with universities (Adeje), or tax incentives and supporting programs (Málaga). Interestingly, most cities aim to enhance resilience from a social perspective, for example, by delving into transversal issues such as energy poverty (Barcelona, San Bartolomé de Tirajana, Málaga), the gender dimension, and those most vulnerable target groups (Barcelona). Regarding future scenarios, all plans except San Bartolomé de Tirajana and Calvià include climate change projections (mainly focused on temperature and precipitation patterns from

Table 4.5 Environmental dimension, components, and indicators in case studies

City	Risk exposure			Main impacts					Expected benefits			Future scenarios	
	R1	R2	R3	I1	I2	I3	I4	I5	B1	B2	B3	F1	F2
Madrid		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Barcelona		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Sevilla		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Palma		✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Benidorm		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Valencia		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
San Bartolomé de Tirajana		✓	✓	✓	✓	✓	✓	✓	✓	✓			
Calvià		✓	✓	✓	✓	✓	✓	✓	✓	✓			✓
Adeje		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Málaga		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Source Authors' own elaboration

Codes Legend R1 (ecosystem services), R2 (comfort and health), R3 (infrastructures and services); I1 (rising temperatures), I2 (heatwaves and droughts), I3 (less rainfall or erratic patterns), I4 (storms and floods), I5 (sea level rise); B1 (reducing exposure), B2 (reducing sensitivity), B3 (enhancing resilience); F1 (climate projections), F2 (GHG emissions reduction target)

RCP 4.5 and RCP 8.5 scenarios), albeit with different time frames starting from the short- and mid-term (2030–2050) as in the case of Málaga, to the long-term as for Barcelona, Palma, Benidorm, Valencia, and Adeje). However, concerning GHG emissions, cities tend to limit their projections to the short-term (2020–2030) as for Palma, Calvià, and Adeje or to the mid-term scenarios (2050) as for Madrid or Málaga.

Policy Coherence

The policy coherence framework analysis identifies how most plans explicitly or implicitly recognize the factors building coherence between adaptation actions and associated management (Table 4.6). Motivation factors considering observed climate change trends are explicitly reported in all cities, while most cities (all except San Bartolomé de Tirajana and Calvià) also pointed out the projected patterns for the short-medium term (e.g., 2030–2050). Interestingly, cities explicitly or implicitly notice measures related to the tourism sector, in most cases combined with a proactive management role. In general, cities tend to provide an institutional set-up about the measures planned to develop while assuming different levels of responsibility. Likewise, all cities point out the budget or cost of implementing actions, sometimes subordinated to supporting areas. Regarding the monitoring and evaluation processes, all cities explicitly arrange implementation follow-ups, while all except Barcelona also explicitly report the advances of the plan.

The policy coherence test highlights an average score for the cities' level of accuracy of 83.5/100 points. Cities obtain an average of 18/20 points when planning adaptation in terms of observed and perceived climate change trends (*motivation*), 15.5/20 points regarding the role and focus on tourism activities (*measures*), 30.5/40 points on actions' responsibility and supporting management (*implementation & resources*), and 19.5/20 points on reporting and balancing actions' expected results (*monitoring & evaluation*). Interestingly, the only two issues where all city plans coincide are related to the 'motivation' and 'monitoring & evaluation' blocks: reporting observed climate change trends and implementation follow-ups (10/10 points for each). In contrast, less background is provided regarding supporting areas (5/10 points).

By cities, the average score for policy coherence is 8/10, moving from the lowest levels obtained by some of the largest cities (e.g., Madrid, Barcelona, Sevilla) (8/10 points) to the highest levels obtained by Palma and Benidorm (10/10 points). However, findings suggest that cities do not report the same level of coherency for each category and related factors. Figure 4.3 provides an overview of how cities respond to each policy coherence factor. Results indicate the highest scores in detailing the implementation processes and resources available to develop the mitigation/adaptation plan. Out of four points, Palma, Benidorm and Valencia score better in the 'implementation and resources' category, while for 'monitoring and

Table 4.6 Policy coherence analysis to each case study

Factor	Variables	Explicit	Implicit	Not mentioned
Motivation	1	ALL		
	2	Madrid, Barcelona, Sevilla, Palma, Benidorm, Valencia, Adeje, Málaga		San Bartolomé de Tirajana, Calvià
Measures	3	Sevilla, Palma, Benidorm, San Bartolomé de Tirajana, Calvià	Madrid, Barcelona, Valencia, Adeje, Málaga	
	4	Sevilla, Benidorm, San Bartolomé de Tirajana, Calvià, Adeje, Málaga	Madrid, Barcelona, Palma, Valencia	
Implementation and resources	5	Barcelona, Palma, Benidorm, Valencia, Calvià, Málaga	Madrid, Sevilla, San Bartolomé de Tirajana, Adeje	
	6	Madrid, Palma, Benidorm, Valencia, San Bartolomé de Tirajana, Calvià, Adeje	Barcelona, Sevilla, Málaga	
	7	Sevilla, Palma, Benidorm, Valencia, San Bartolomé de Tirajana, Calvià, Adeje, Málaga	Madrid, Barcelona	
	8	Madrid, Barcelona, Palma, Benidorm	Valencia, Málaga	Sevilla, San Bartolomé de Tirajana, Calvià, Adeje
Monitoring and evaluation	9	ALL		
	10	Madrid, Sevilla, Palma, Benidorm, Valencia, San Bartolomé de Tirajana, Calvià, Adeje, Málaga	Barcelona	

Source Authors' own elaboration

Legend Observed climate change trends (1), projected climate change impacts (2), tourism related (3), pro-active management (4), institutional set-up (5), responsibilities (6), financial (7), supporting areas (8), implementation follow-ups (9), reporting (10)

evaluation' factors, cities pursue a common pattern in which only Barcelona hold lower relevance.

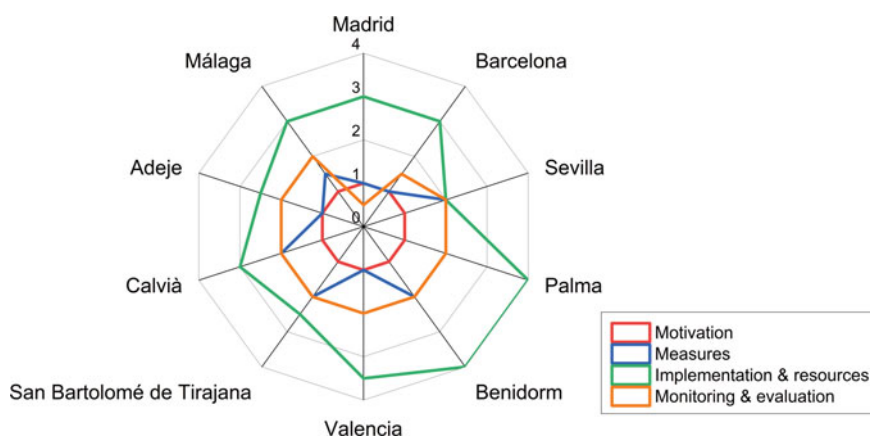


Fig. 4.3 Policy coherence scores by city and according to main factors. *Source* Authors' own elaboration

Discussion and Conclusions

Climate change is the single most important global environmental issue facing the world today and has emerged as a major topic in tourism analysis. Increasing temperatures and changes in rainfall patterns are already affecting the tourism industry and are anticipated to have profound implications for tourism in the twenty-first century, including consumer holiday choices, the geographic patterns of tourism demand, the competitiveness and sustainability of destinations, and the contribution of tourism to international and sustainable development, particularly in semi-arid regions (Grafakos et al., 2020; Scott et al., 2012). Regional studies also identified the effects of climate change, for example, on the Spanish tourist activity, including (1) loss of market share worldwide; (2) long-term reduction in the number of tourist arrivals; (3) relative loss of relevance of sun and beach tourism destinations due to the lack of climatic comfort in summer; and (4) possible changes in inland tourist destinations, with a loss of importance of the Mediterranean coast (Olcina Cantos, & Vera-Rebollo, 2016). Tourism is not a tangential activity but rather a significant agent of change, modifying policies, economies, landscapes, societies, cultures, and behaviors. It is part of the forces that affect and are affected by the geophysical changes that characterize the Anthropocene, asking for action and attitude change (Giannetti et al., 2020).

This research explored if and how the ten most visited Spanish cities adapt to climate change impacts by delving into their local mitigation and/or adaptation plans. The triple-loop approach to determine the political, social, and environmental nature of their adaptive capacity reported three main issues. First, city plans include mitigation and adaptation actions, in most cases being framed in a more ambitious adaptation strategy, which opens the door to considering climate change mitigation and adaptation as cross-sectoral tasks that are integrated into major city development

processes (e.g., urban and transport planning, green area management, education, etc.) (Kern, 2019). However, findings show that, even if it can benefit from the adaptation measure, tourism is not explicitly mentioned when promoting most of the actions, mainly focused on combining technological and hard measures to ensure water and/or energy savings and management and reinforce renewable energy sources, with the final aim of setting up strategies to become green, sustainable, circular, carbon-neutral, and resilient for both the residents and tourists (Haupt et al., 2022). Second, cities agree to promote bottom-up approaches and participation mechanisms, mainly focused on awareness campaigns, studies, and education or learning activities (e.g., conferences, workshops, surveys), to collect citizen perspectives and behaviors on climate change. Other soft measures, such as normative updates or the promotion of coordination agencies, are also considered to align adaptation and development into synergistic planning while reinforcing urban governance (Saikia et al., 2022). Finally, although plans recognize climate change risks and impacts of extreme weather events, only some cities provide details on how risk exposure affects ecosystem services, comfort and health, and infrastructures and services or how to manage risk and potential damages at the local urban scale. Conversely, plans prefer to focus on the expected benefits of developing actions, particularly when these actions entail enhancing resilience from a social perspective while delving into multi-focal issues (e.g., energy poverty, gender dimension, most vulnerable target groups and activities), which fits with the integrated assessment of climate change adaptation to increase urban resilience (Velasco et al., 2020). Interestingly, these three main issues are not conditioned by differences in cities' behavior according to their location. However, large cities (Madrid, Barcelona, and Valencia) tend to understand urban planning beyond the effect of tourism (i.e., they are considered as 'cities with tourists'). On the contrary, the smaller ones consider tourism as an active sector in planning (i.e., they are envisaged as 'tourist cities').

Furthermore, the policy coherence test pointed to the need to strengthen the attention to tourism-related measures and a more pro-active engagement of the tourism industry to motivate more accurate actions in the medium and long terms. Likewise, some studies (Olazabal & Ruiz de Gopegui, 2021) consider financial availability as one of the most important indicators of policy coherence because it determines the capacity to change and improve policies at the local scale. Our findings reported how most cities provide a detailed plan in terms of budget allocation and cost for each action, which facilitates the applicability and timing standards of the adaptation plan. However, authors such as Huttunen et al. (2014) also assert that policy coherence requires consistency between goals, instruments, and implementation procedures to promote synergies and mitigate conflicts between and within different sectors to achieve intended objectives. Our analysis tested the level of accuracy in terms of motivation, measures, implementation and resources, and monitoring and evaluation, obtaining the best results in the implementation and resources panel, with particular attention on follow-up strategies, which could be interpreted as the ambitious nature of the cities' climate adaptation targets to meet the Paris Agreement (Salvia et al., 2021). Further research should investigate the effects of climate change on tourism activity and how adaptation plans can be interpreted as benefits for their value chain.

Likewise, it is also necessary to deepen into how effective tourism incorporation is in municipal mitigation and adaptation strategies is and how different public administrations at the local, regional, and national scales interact and ensure the collaboration of public and private agents. This study focuses exclusively on analyzing the coherence of climate change adaptation and mitigation plans, which are a requirement for all selected municipalities. The existence of a plan, with actions, a budget and a timetable, does not guarantee that the municipality is acting with adequate initiatives in line with the current reality. A possible gap is thus identified between what is planned and what is actually being carried out. This gap opens a new and future line of study, aimed at verifying the robustness and accuracy of the plans according to their planned expectations.

Funding This work was supported by the Spanish Ministry of Science and Innovation, Grant PID2020-114186RB-C22 funded by MCIN-AEI/<https://doi.org/10.13039/501100011033>, and the European Commission under the Water JPI 2018 Joint Call on Sustainable Management of Water Resources—WaterWorks2017 [SIMTWIST project].

References

- Ahmed, A., Afik, B., Akanbang, A., Poku-Boansi, M., & Derbile, E. K. (2022). Policy coherence between climate change adaptation and urban policies in Ghana: Implications for adaptation planning in African cities. *International Journal of Urban Sustainable Development*, 14(1), 77–90. <https://doi.org/10.1080/19463138.2022.2066106>
- Arabadzhyan, A., Figini, P., García, C., González, M. M., Lam-González, Y. E., & León, C. J. (2021). Climate change, coastal tourism, and impact chains—a literature review. *Current Issues in Tourism*, 24(16), 2233–2268. <https://doi.org/10.1080/13683500.2020.1825351>
- Becken, S., Whittlesea, E., Loehr, J., & Scott, D. (2020). Tourism and climate change: Evaluating the extent of policy integration. *Journal of Sustainable Tourism*, 28(10), 1603–1624. <https://doi.org/10.1080/09669582.2020.1745217>
- Bock, K. (2015). The changing nature of city tourism and its possible implications for the future of cities. *European Journal of Futures Research*, 3, 20. <https://doi.org/10.1007/s40309-015-0078-5>
- Boyd, D., Pathak, M., van Diemen, R., & Skea, J. (2022). Mitigation co-benefits of climate change adaptation: A case-study analysis of eight cities. *Sustainable Cities and Society*, 77, 103563. <https://doi.org/10.1016/j.scs.2021.103563>
- Castán Broto, V. (2017). Urban governance and the politics of climate change. *World Development*, 93, 1–15. <https://doi.org/10.1016/j.worlddev.2016.12.031>
- Cheer, J. M., & Lew, A. A. (2017). *Tourism, resilience and sustainability: Adapting to social, political and economic change*. Routledge.
- Franzoni, S., & Pelizzari, C. (2019). Rainfall financial risk assessment in the hospitality industry. *International Journal of Contemporary Hospitality Management*, 31(3), 1104–1121. <https://doi.org/10.1108/IJCHM-10-2017-0632>
- Giannetti, B. F., Agostinho, F., Almeida, C. M. V. B., Liu, G., Contreras, L. E. V., Vandecasteele, C., Coscieme, L., Sutton, P., & Poveda, C. (2020). Insight on the United Nations sustainable development goals scope: Are they aligned with a ‘strong’ sustainable development? *Journal of Cleaner Production*, 252, 119574. <https://doi.org/10.1016/j.jclepro.2019.119574>
- Glass, L. M., & Newig, J. (2019). Governance for achieving the sustainable development goals: How important are participation, policy coherence, reflexivity, adaptation and democratic institutions? *Earth System Governance*, 2, 100031. <https://doi.org/10.1016/j.esg.2019.100031>

- Gómez-Martín, M. B. (2017). Retos del turismo español ante el cambio climático. *Investigaciones Geográficas*, 67, 31–47. <https://doi.org/10.14198/INGEO2017.67.02>
- Grafakos, S., Viero, G., Reckien, D., Trigg, K., Viguie, V., Sudmant, A., Graves, C., Foley, A., Heidrich, O., Mirailles, J. M., Carter, J., Chang, L. H., Nador, C., Liseri, M., Chelleri, L., Orru, H., Orru, K., Aelenei, R., Bilska, A., Pfeiffer, B., Lepetit, Q., Church, J. M., Landauer, M., Gouldson, A., & Dawson, R. (2020). Integration of mitigation and adaptation in urban climate change action plans in Europe: A systematic assessment. *Renewable and Sustainable Energy Reviews*, 121, 109623. <https://doi.org/10.1016/j.rser.2019.109623>
- Hachaichi, M. (2022). Cities: Allocating climate change responsibilities at planetary scale. *Urban Climate*, 46, 101329. <https://doi.org/10.1016/j.uclim.2022.101329>
- Haupt, W., Eckersley, P., Irmisch, J., & Kern, K. (2022). How do local factors shape transformation pathways towards climate-neutral and resilient cities? *European Planning Studies*. <https://doi.org/10.1080/09654313.2022.2147394>
- Huang, K., Li, X., Liu, X., & Seto, K. C. (2019). Projecting global urban land expansion and heat island intensification through 2050. *Environmental Research Letters*, 14(11), 114037. <https://doi.org/10.1088/1748-9326/ab4b71>
- Hurlimann, A., Moosavi, S., & Browne, G. R. (2021). Urban planning policy must do more to integrate climate change adaptation and mitigation actions. *Land Use Policy*, 101, 105188. <https://doi.org/10.1016/j.landusepol.2020.105188>
- Huttunen, S., Kivimaa, P., & Virkamäki, V. (2014). The need for policy coherence to trigger a transition to biogas production. *Environmental Innovation and Societal Transitions*, 12, 14–30. <https://doi.org/10.1016/j.eist.2014.04.002>
- Iwami, A., Matsui, T., Kimura, M., Baba, K., & Tanaka, M. (2020). Organizing the challenges faced by municipalities while formulating climate change adaptation plans. *Sustainability*, 12, 1203. <https://doi.org/10.3390/su12031203>
- Jiricka-Purrer, A., Brandenburg, C., & Probstl-Haider, U. (2020). City tourism pre- and post-covid-19 pandemic—Messages to take home for climate change adaptation and mitigation? *Journal of Outdoor Recreation and Tourism*, 31, 100329. <https://doi.org/10.1016/j.jort.2020.100329>
- Jopp, R., DeLacy, T., & Mair, J. (2010). Developing a framework for regional destination adaptation to climate change. *Current Issues in Tourism*, 13(6), 591–605. <https://doi.org/10.1080/13683501003653379>
- Joppe, M. (2018). Tourism policy and governance: Quo vadis? *Tourism Management Perspectives*, 25, 201–204. <https://doi.org/10.1016/j.tmp.2017.11.011>
- Kajan, E., & Saarinen, J. (2013). Tourism, climate change and adaptation: A review. *Current Issues in Tourism*, 16(2), 167–195. <https://doi.org/10.1080/13683500.2013.774323>
- Kelleher, L., Henchion, M., & O'Neill, E. (2019). Policy coherence and the transition to a bioeconomy: The case of Ireland. *Sustainability*, 11, 7247. <https://doi.org/10.3390/su11247247>
- Kern, K. (2019). Cities as leaders in EU multilevel climate governance: Embedded upscaling of local experiments in Europe. *Environmental Politics*, 28(1), 125–145. <https://doi.org/10.1080/09644016.2019.1521979>
- Kostianaiia, E. A., & Kostianoy, A. G. (2021). Regional climate change impact on coastal tourism: A case study for the Black Sea Coast of Russia. *Hydrology*, 8(3), 133. <https://doi.org/10.3390/hydrology8030133>
- Landauer, M., Juhola, S., & Klein, J. (2019). The role of scale in integrating climate change adaptation and mitigation in cities. *Journal of Environmental Planning and Management*, 62(5), 741–765. <https://doi.org/10.1080/09640568.2018.1430022>
- Ledda, A., Di Cesare, E. A., Satta, G., Cocco, G., & De Montis, A. (2021). Integrating adaptation to climate change in regional plans and programmes: The role of strategic environmental assessment. *Environmental Impact Assessment Review*, 91, 106655. <https://doi.org/10.1016/j.eiar.2021.106655>
- Lin, B. B., Ossola, A., Alberti, M., Andersson, E., Bai, X., Dobbs, C., Elmqvist, T., Evans, K. L., Frantzeskaki, N., Fuller, R. A., Gaston, K. J., Haase, D., Jim, C. Y., Konijnendijk, C., Nagendra, H., Niemelä, J., McPhearson, T., Moomaw, W. R., Parnell, S., Pataki, D., Ripple, W. J., & Tan,

- P. Y. (2021). Integrating solutions to adapt cities for climate change. *Lancet Planet Health*, 5, 479–486. [https://doi.org/10.1016/S2542-5196\(21\)00135-2](https://doi.org/10.1016/S2542-5196(21)00135-2)
- Loehr, J. (2020). The Vanuatu tourism adaptation system: A holistic approach to reducing climate risk. *Journal of Sustainable Tourism*, 28(4), 515–534. <https://doi.org/10.1080/09669582.2019.1683185>
- Loehr, J., & Becken, S. (2021). The tourism climate change knowledge system. *Annals of Tourism Research*, 86, 103073. <https://doi.org/10.1016/j.annals.2020.103073>
- Lopes, H. S., Remoaldo, P. C., Ribeiro, V., & Martín-Vide, J. (2022). Pathways for adapting tourism to climate change in an urban destination—Evidences based on thermal conditions for the Porto Metropolitan Area (Portugal). *Journal of Environmental Management*, 315, 115161. <https://doi.org/10.1016/j.jenvman.2022.115161>
- Madsen, S. H. J., & Hansen, T. (2018). Cities and climate change—Examining advantages and challenges of urban climate change experiments. *European Planning Studies*, 27, 282–299. <https://doi.org/10.1080/09654313.2017.1421907>
- Ngxongo, N. A. (2021). The impact of climate change on visitor destination selection: A case study of the Central Drakensberg Region in KwaZulu-Natal. *JAMBA Journal of Disaster Risk Studies*, 13(1), 1161. <https://doi.org/10.4102/jamba.v13i1.1161>
- Njoroge, J. M. (2015). Climate change and tourism adaptation: Literature review. *Tourism and Hospitality Management*, 21(1), 95–108. <https://doi.org/10.20867/thm.21.1.7>
- Olazabal, M., & Ruiz de Gopegui, M. (2021). Adaptation planning in large cities is unlikely to be effective. *Landscape and Urban Planning*, 206, 103974. <https://doi.org/10.1016/j.landurbplan.2020.103974>
- Olcina Cantos, J., & Vera-Rebollo, J. F. (2016). Adaptación del sector turístico al cambio climático en España. La importancia de las acciones a escala local y en empresas turísticas. *Anales de Geografía de la Universidad Complutense*, 36(2) 321–349. <https://doi.org/10.5209/AGUC.53588>
- Ranabhat, S., Ghate, R., Bhatta, L. D., Agrawal, N. K., & Tankha, S. (2018). Policy coherence and interplay between climate change adaptation policies and the forestry sector in Nepal. *Environmental Management*, 61, 968–980. <https://doi.org/10.1007/s00267-018-1027-4>
- Reckien, D., Salvia, M., Heidrich, O., Church, J.M., Pietrapertosa, F., de Gregorio-Hurtado, S., d'Alonzo, V., Foley, A., Simoes, S. G., Lorencová, E. K., Orru, H., & Dawson, R. (2018). How are cities planning to respond to climate change? Assessment of local climate plans from 885 cities in the EU-28. *Journal of Cleaner Production*, 191, 207–219. <https://doi.org/10.1016/j.jclepro.2018.03.220>
- Ricart, S., Berizzi, C., Saurí, D., & Terlicher, G. N. (2022). The social, political, and environmental dimensions in designing urban public space from a water management perspective: Testing European experiences. *Land*, 11, 1575. <https://doi.org/10.3390/land11091575>
- Saikia, P., Beane, G., Giné-Garriga, R., Avello, P., Ellis, L., Fisher, S., Leten, J., Ruiz-Apilánez, I., Shouler, M., Ward, R., & Jiménez, A. (2022). City water resilience framework: A governance based planning tool to enhance urban water resilience. *Sustainable Cities and Society*, 77, 103497. <https://doi.org/10.1016/j.scs.2021.103497>
- Salvia, M., Reckien, D., Pietrapertosa, F., Eckersley, P., Spyridaki, N.-A., Krook-Riekkola, A., Ozabal, M., Hurtado, S. D. G., Simoes, S. G., Geneletti, D., Vigiú, V., Fokaides, P. A., Ioannou, B. I., Flamos, A., Csete, M. S., Buzasi, A., Orru, H., de Boer, C., Foley, A., Rižnar, K., & Heidrich, O. (2021). Will climate mitigation ambitions lead to carbon neutrality? An analysis of the local-level plans of 327 cities in the EU. *Renewable and Sustainable Energy Reviews*, 135, 110253. <https://doi.org/10.1016/j.rser.2020.110253>
- Schweinsberg, S., & Darcy, S. (2022). Climate change, time and tourism knowledge: The relativity of simultaneity. *Sustainability*, 14, 16220. <https://doi.org/10.3390/su142316220>
- Scott, D. (2021). Sustainable tourism and the grand challenge of climate change. *Sustainability*, 13, 1966. <https://doi.org/10.3390/su13041966>

- Scott, D., & Gössling, S. (2022). A review of research into tourism and climate change—Launching the annals of tourism research curated collection on tourism and climate change. *Annals of Tourism Research*, 95, 103409. <https://doi.org/10.1016/j.annals.2022.103409>
- Scott, D., Hall, C. M., & Gössling, S. (2012). *Tourism and climate change: Impacts, adaptation and mitigation: Contemporary geographies of leisure, tourism and mobility*. Routledge.
- Scott, D., Hall, C. M., & Gössling, S. (2019). Global tourism vulnerability to climate change. *Annals of Tourism Research*, 77, 49–61. <https://doi.org/10.1016/j.annals.2019.05.007>
- Serra, V., Ledda, A., Ruii, M. G. G., Calia, G., Mereu, V., Bacciu, V., Marras, S., Spano, D., & De Montis, A. (2022). Adaptation to climate change across local policies: An investigation in six Italian cities. *Sustainability*, 14, 8318. <https://doi.org/10.3390/su14148318>
- Vale, L. J. (2014). The politics of resilient cities: Whose resilience and whose city? *Building Research & Information*, 42, 191–201. <https://doi.org/10.1080/09613218.2014.850602>
- Velasco, M., Russo, B., & Martínez-Gomariz, E. (2020). Integrated assessment of climate change impacts and urban resilience: From climate and hydrological hazards to risk analysis and measure. *Sustainability*, 12(16), 6430. <https://doi.org/10.3390/su12166430>
- Weaver, D., Moyle, B. D., Casali, L., & McLennan, C.-L. (2022). Pragmatic engagement with the wicked tourism problem of climate change through ‘soft’ transformative governance. *Tourism Management*, 93, 104573. <https://doi.org/10.1016/j.tourman.2022.104573>
- Yong, E. L. (2021). Understanding the economic impacts of sea-level rise on tourism prosperity: Conceptualization and panel data evidence. *Advances in Climate Change Research*, 12(2), 240–253. <https://doi.org/10.1016/j.accre.2021.03.009>

Carmen Mínguez is a tenured professor in Geography at the Complutense University of Madrid. Her research examines the relationships and the interdependencies between tourism and historic cities, specifically focusing on how to improve cultural heritage and functionally revitalize historic centers and monumental areas of cities. In recent years, Carmen has incorporated into her research the use of Big (Geo)data (social networks and photo-sharing services) and the Citizen Science approach for the study, planning, and management of destinations. She is a member of the ‘Tourism, Heritage and Development’ research group. She received her Ph.D. in Geography (2007), a graduate degree in Social and Cultural Anthropology (2011), a master’s degree in Cultural Heritage Management (2006), and an expert degree in Geographic Information Systems and Remote Sensing (2000), by the Complutense University of Madrid, Spain. She has participated in 16 research projects of competitive calls and in numerous research contracts with institutions. She published more than 20 scientific papers in WoS and Scopus journals and attended more than seventy international and national conferences. Carmen teaches in different postgraduate courses in Geography, Architecture, and Archaeology, in Spain and Mexico.

Sandra Ricart is Assistant Professor at the Environmental Intelligence for Global Change Lab (EI Lab), at the Department of Electronics, Information and Bioengineering at the Politecnico di Milano, Italy. As human–environment geographer, she delves into climate change perceived impacts and adaptive capacity through stakeholder analysis and behavior modeling, and water management and governance in socio-ecological systems from social learning and risk analysis. She received his Ph.D. in Experimental Sciences and Sustainability (2014) and a master’s degree in Environmental Sciences (2009) by the University of Girona, Spain. In 2020 she was granted with a Marie Skłodowska-Curie Action post-doctoral research fellowship to join the EI Lab. Since 2018 she is associate researcher and lecturer in different MSc programs on natural risks, water management, and sustainable development law at the University of Alicante, Spain. She was Visiting Researcher at different universities in France, Italy, and the Netherlands; published more than forty scientific papers in WoS and Scopus journals, attended more than seventy international and national conferences; and participated in several international and national research projects. Dr. Ricart was expert evaluator and rapporteur of research programs promoted by the European

Commission, the Agence Nationale de la Recherche, the Swedish Council for Sustainable Development, the Latvian Council of Science, and the Dutch Research Council. In 2022 she received the I3 Program Certificate of Outstanding Research Trajectory, one of the most prestigious tenure-track research programs, by the Spanish State Research Agency (AEI) and the Spanish Ministry of Science and Innovation.