HISTORIC URBAN LANDSCAPES AND URBAN RESILIENCE: INTEGRATING CULTURAL HERITAGE INTO SUSTAINABLE PLANNING IN MEDITERRANEAN CITIES

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Abstract
Historic cities across the Mediterranean are increasingly facing complex and interrelated pressures arising from climate change, tourism intensification, socio-economic transformation, and fragmented governance systems. These dynamics place significant strain not only on the physical fabric of cultural heritage but also on the social and ecological systems that sustain historic urban environments. Conventional heritage management approaches have traditionally focused on the protection of individual monuments or architectural ensembles. While valuable, such approaches often fail to address the broader urban processes and environmental challenges that affect historic districts as living and evolving systems.

In response to these limitations, the Historic Urban Landscape (HUL) approach, introduced by UNESCO in 2011, proposes a more comprehensive framework that integrates heritage conservation with sustainable urban development, climate adaptation, and urban resilience strategies. This article explores the potential of the HUL approach to strengthen resilience in Mediterranean historic cities through an in-depth case study of Chania, Crete. The research adopts a qualitative multi-method design that combines spatial analysis of urban form, policy review of planning and governance frameworks, and semi-structured interviews with key stakeholders involved in heritage management and urban development.

The findings highlight several structural challenges, including institutional fragmentation, tourism-driven spatial transformations, limited community participation in planning processes, and insufficient integration of climate adaptation measures into heritage management practices. At the same time, emerging initiatives—such as adaptive reuse projects, participatory cultural programs, and growing awareness of climate-related risks—indicate opportunities for more integrated planning approaches. The study argues that historic urban environments should be understood as complex socio-ecological systems where heritage conservation, community well-being, environmental sustainability, and local economic activity are deeply interconnected and mutually dependent.

Keywords: *historic urban landscape, cultural heritage management, urban resilience, Mediterranean cities, tourism pressure, climate adaptation, Chania*

1. INTRODUCTION

Historic cities represent some of the most culturally significant and socially complex urban environments in the world. Their layered urban fabrics reflect centuries of architectural, social, economic, and political transformations, creating landscapes that embody collective memory and cultural identity. In Europe, historic cities play a central role in cultural tourism, regional development, and urban identity. However, these cities are also increasingly exposed to environmental, economic, and social pressures that challenge traditional approaches to heritage conservation.

Mediterranean historic cities are experiencing profound transformations driven by climate change, global tourism dynamics, demographic shifts, and evolving urban development patterns. These pressures are especially pronounced in coastal historic settlements, where environmental risks intersect with intense tourism activity and rapid socio-economic change. As a result, many historic urban areas face growing tensions between conservation objectives, economic development strategies, and community needs.

Traditional heritage management frameworks have often focused on preserving individual monuments, historic buildings, or architectural ensembles through regulatory protection mechanisms. While such approaches have been successful in safeguarding important cultural assets, they have proven insufficient for addressing broader urban challenges such as climate adaptation, housing pressures, tourism impacts, and infrastructure modernization ((Bandarin, & Van Oers, 2012)). In many cases, heritage policies operate separately from urban planning systems, resulting in fragmented governance structures that hinder integrated decision-making.

In recent years, international heritage policy has increasingly emphasized the need for holistic approaches that integrate cultural heritage conservation into broader urban development strategies. One of the most influential initiatives in this direction is the Historic Urban Landscape (HUL) Recommendation, adopted by UNESCO in 2011. The HUL framework redefines historic cities as dynamic landscapes shaped by the interaction of cultural, natural, and socio-economic processes over time (UNESCO, 2011)

Rather than focusing solely on preserving physical structures, the HUL approach emphasizes the management of urban changes in ways that respect historical identity while accommodating contemporary development needs. This shift reflects a growing recognition that historic cities must remain living environments capable of adapting to evolving environmental and socio-economic conditions.

The integration of heritage conservation with urban resilience planning is particularly important in the context of climate change. Coastal historic cities across the Mediterranean face increasing risks from sea-level rise, extreme heat events, flooding, and water scarcity. These environmental threats pose significant challenges for heritage preservation and urban infrastructure systems alike.

At the same time, tourism growth has become a defining feature of many historic cities. While tourism provides important economic benefits, it can also generate negative impacts such as overcrowding, housing displacement, infrastructure strain, and commercialization of historic spaces ((Buitrago & Yñiguez, 2021) . These processes often transform historic neighborhoods into visitor-oriented environments that gradually lose their social diversity and cultural authenticity.

This article explores the role of the Historic Urban Landscape framework in addressing these interconnected challenges. Through a detailed case study of Chania, a historic city on the island of Crete, the research examines how heritage management practices interact with tourism dynamics, environmental vulnerabilities, and urban governance systems.

The present study seeks to explore and address three central research questions that guide the overall analysis and structure of the investigation. Specifically, it examines the range of environmental, socio-economic, and governance-related challenges that affect and shape historic urban landscapes in Mediterranean cities, where the interaction between heritage conservation, urban growth, and environmental pressures often creates complex management conditions. In addition, the research investigates how increasing tourism pressures, together with emerging climate-related risks such as rising temperatures, extreme weather events, and environmental degradation, influence patterns of urban development and spatial transformation within historic districts. Furthermore, the study considers how the Historic Urban Landscape approach may provide an integrated conceptual and practical framework

capable of supporting more resilient, adaptive, and sustainable forms of heritage management in historic urban environments.

By examining these issues in a comprehensive manner, the article contributes to broader interdisciplinary discussions on cultural heritage management, sustainable urban development, and urban resilience planning in historic cities. In doing so, it aims to provide insights that may inform both academic debates and policy-oriented strategies for balancing conservation objectives with the evolving social, environmental, and economic dynamics that characterize historic urban areas.

2. CULTURAL HERITAGE AND URBAN RESILIENCE

Urban resilience refers to the capacity of cities to absorb disturbances, adapt to changing conditions, and maintain essential functions while transforming ((Meerow, Newell, & Stults, 2016) . While resilience research has traditionally focused on infrastructure systems, environmental processes, and disaster management, recent studies emphasize the importance of social and cultural dimensions in shaping urban adaptive capacity.

Cultural heritage plays a crucial role in this context because it contributes to social cohesion, identity, and continuity that support community resilience (Diekmann & Gillot, 2010). Historic environments often contain dense networks of social relationships and cultural practices that enable communities to respond collectively to environmental or economic disruptions. Furthermore, heritage assets frequently serve as key economic resources, particularly in tourism-dependent regions. Historic districts attract visitors, generate employment opportunities, and support local businesses. However, excessive dependence on tourism can also create vulnerabilities, especially when economic activity becomes highly seasonal or externally driven. Scholars increasingly argue that heritage conservation should be integrated into broader resilience strategies rather than treated as a separate policy domain (Van Oers, 2008). Such integration requires interdisciplinary approaches that consider cultural, environmental, and socio-economic factors simultaneously.

3. THE HISTORIC URBAN LANDSCAPE FRAMEWORK

The **Historic Urban Landscape (HUL) approach** represents a significant transformation in the way cultural heritage is understood and managed within contemporary urban contexts. Emerging from evolving debates in international heritage policy and formally articulated in the UNESCO Recommendation on the Historic Urban Landscape (UNESCO, 2011), the HUL framework moves beyond traditional conservation paradigms that primarily focus on the preservation of individual monuments, historic buildings, or architecturally significant ensembles. Instead, it proposes a more comprehensive and dynamic understanding of historic cities as complex, layered urban landscapes, shaped over long periods through the interaction of cultural, environmental, economic, and social processes.

Within this perspective, historic urban areas are not treated as static entities frozen in time but as living environments that continuously evolve in response to changing societal needs, environmental conditions, and economic dynamics. The HUL approach, therefore, recognizes that heritage conservation must engage with broader urban systems and development processes. By situating cultural heritage within the wider urban landscape, the framework emphasizes the importance of understanding how historical layers, natural features, spatial structures, and community practices collectively shape the identity and functionality of cities (UNESCO, 2013).

A central premise of the HUL approach is that heritage conservation should be integrated into broader strategies for sustainable urban development. This requires moving beyond

sectoral policies that treat heritage management as an isolated domain. Instead, heritage must be considered alongside urban planning, environmental management, economic development, and social policy. In this way, the HUL framework promotes a holistic and interdisciplinary perspective that acknowledges the interconnected nature of urban systems and the multiple values embedded in historic environments.

Several core principles underpin the implementation of the Historic Urban Landscape framework. One of the most important elements is the integration of urban planning and heritage conservation. Rather than separating heritage protection from development planning, the HUL approach encourages coordinated strategies that allow historic cities to accommodate change while safeguarding their cultural significance. This integration helps ensure that new urban interventions—such as infrastructure upgrades, tourism development, or housing initiatives—are compatible with the historical character and spatial structure of the urban landscape (Bandarin, 2006).

Another key component of the HUL framework is the emphasis on participatory governance and stakeholder engagement. Effective heritage management requires the active involvement of multiple stakeholders, including local communities, public authorities, heritage professionals, private sector entities, and civil society organizations. By fostering inclusive decision-making processes, the HUL approach aims to strengthen the social legitimacy of conservation policies and ensure that heritage management reflects the diverse values and priorities of local communities (Wang, Fan, & You, 2025).

The framework also promotes a landscape-based approach to analysis and planning, which involves examining the relationships between cultural heritage assets, natural ecosystems, urban morphology, and socio-economic activities. Through comprehensive mapping and assessment of these interconnected elements, planners and heritage practitioners can gain a deeper understanding of the spatial and functional dynamics that shape historic cities (Barrado-Timón, & Hidalgo-Giralt, 2019). This broader perspective helps identify both the tangible and intangible components of urban heritage, including public spaces, traditional land-use patterns, cultural practices, and environmental features. In addition, the HUL approach highlights the importance of adaptive management strategies that allow historic cities to respond to ongoing social, environmental, and economic transformations. Rather than attempting to prevent change, the framework focuses on managing change in ways that respect historical continuity while supporting sustainable development. Adaptive management tools may include regulatory frameworks, urban design guidelines, heritage impact assessments, and monitoring systems that track the long-term effects of development decisions on historic landscapes. Taken together, these principles encourage urban planners, conservation experts, and policymakers to view historic cities as **dynamic and evolving systems**ratherthan as static collections of monuments or architectural artifacts. This conceptual shift reflects a broader understanding of heritage as a living resource that contributes to urban identity, social cohesion, and economic vitality.

Bandarin and van Oers (2012) further emphasize that the successful implementation of the HUL framework requires **innovative governance models** capable of coordinating multiple policy domains and institutional actors. Because heritage conservation intersects with urban development, environmental management, tourism planning, and community interests, traditional hierarchical governance structures often prove insufficient. Instead, more collaborative and cross-sectoral governance arrangements are needed to facilitate information exchange, joint decision-making, and integrated planning (Bandarin, & Van Oers, 2012).

Such governance frameworks typically involve partnerships between municipal authorities, heritage agencies, planning departments, academic institutions, and community organizations (Zeayter & Mansour , 2017). By promoting collaboration among these actors, the HUL approach aims to ensure that heritage protection is aligned with broader objectives

related to environmental sustainability, social inclusion, and economic development. In this sense, the Historic Urban Landscape framework provides not only a conceptual model for understanding historic cities but also a **practical strategy for managing urban change in culturally sensitive and sustainable ways**.

Ultimately, the HUL approach reflects a growing recognition that the long-term preservation of historic urban environments depends on their ability to remain **vibrant, functional, and socially meaningful places**. By integrating heritage conservation into broader urban planning processes and encouraging participatory governance, the framework offers a pathway for balancing the protection of cultural heritage with the demands of contemporary urban life (Dimelli, 2022).

4. RESEARCH METHODOLOGY

This study employs a qualitative case study methodology to explore the complex and multidimensional relationships between cultural heritage conservation, urban development processes, tourism dynamics, and emerging environmental risks within the historic city of Chania. The selection of a qualitative methodological framework reflects the need to investigate not only the physical characteristics of the historic urban landscape but also the institutional structures, governance mechanisms, and stakeholder perceptions that influence heritage management and urban resilience. Historic cities are shaped by interrelated spatial, social, and political processes, and therefore require research approaches capable of capturing these interactions in a holistic and context-sensitive manner. Case study research has been widely used in urban and heritage studies to analyze complex socio-spatial systems where multiple variables interact and where contextual conditions play a critical role in shaping outcomes. In the context of historic urban landscapes, the case study approach allows for an in-depth investigation of local dynamics, institutional arrangements, and community perspectives, providing insights that might not emerge through purely quantitative methods. The city of Chania was therefore selected as a representative case through which broader issues affecting Mediterranean historic cities—such as tourism pressure, climate vulnerability, and governance fragmentation—can be examined in detail.

To capture the multiple and interrelated dimensions of the historic urban landscape, the research design adopts an integrated methodological framework that combines several complementary approaches. The first component involves a spatial analysis of urban morphology and land-use patterns to examine the physical structure of the urban environment, the distribution of functions within the historic area, and the ways in which spatial transformations have affected the historic fabric over time. The second component focuses on a policy-oriented analysis of existing planning frameworks, regulatory instruments, and governance structures, aiming to understand how institutional arrangements, planning policies, and administrative processes influence heritage protection and urban development in historic districts. The third component consists of qualitative interviews conducted with key stakeholders involved in heritage management and urban development, including public authorities, planning professionals, local experts, and community representatives. Through these interviews, the study seeks to capture diverse perspectives, practical experiences, and perceptions regarding the challenges and opportunities associated with managing historic urban landscapes in a sustainable and resilient manner. The integration of these methods allows for methodological triangulation, which strengthens the validity of the research by combining different types of data and analytical perspectives. By examining spatial patterns, institutional frameworks, and stakeholder experiences simultaneously, the study develops a comprehensive understanding of how heritage conservation interacts with urban change and resilience planning.

Spatial analysis constitutes a central component of the research methodology, providing insight into the physical structure of Chania's historic center (Fig 1) and the spatial distribution of heritage assets, tourism activities, and urban functions. The analysis focuses on the urban morphology of the Old Town, examining how the historical layers of development—from the Minoan and Byzantine periods to Venetian and Ottoman urban forms shaped contemporary spatial patterns. Mapping techniques were used to identify and visualize several key spatial indicators relevant to the Historic Urban Landscape framework. These include the distribution of heritage assets, such as listed monuments, historic buildings, archaeological sites, and culturally significant public spaces. Understanding the spatial concentration and typology of these assets is essential for assessing the vulnerability of heritage resources and their relationship with surrounding urban activities.

In addition, the spatial analysis examined tourism intensity zones within the historic center. Tourism-related land uses, including hotels, restaurants, retail establishments, and short-term rental accommodations, were mapped to identify areas experiencing the highest levels of visitor pressure. This analysis helped reveal how tourism development has reshaped the functional structure of the historic city, often concentrating on commercial activities around key attractions such as the Venetian harbor and major public squares. Another important dimension of spatial analysis involved the examination of land-use transformations over time. By comparing historical and contemporary land-use patterns, the research traced the gradual conversion of residential buildings into tourism-related functions, as well as the expansion of commercial activities into traditionally residential neighborhoods. These changes have significant implications for the social sustainability of historic districts, as they can lead to declining residential populations and the erosion of local community networks.

Furthermore, the spatial analysis considered the connectivity and accessibility of the historic center in relation to the broader urban area of Chania. The narrow and irregular street network within the fortified Old Town creates challenges for mobility, service delivery, and emergency access, particularly during periods of peak tourism. Mapping these spatial constraints helps identify areas where urban management strategies may need to address infrastructural limitations while respecting the historical integrity of the urban fabric. Overall, the spatial analysis provides a detailed picture of how physical, functional, and environmental pressures intersect within the historic urban landscape, offering valuable insights into the spatial dimensions of urban resilience.

Figure.1 The historic center of Chania

The second methodological component of the research involves a systematic analysis of policy frameworks and governance structures that influence heritage management and urban development in Chania. Heritage conservation does not occur in isolation but is shaped by a complex set of regulatory instruments, planning policies, and institutional arrangements operating at national, regional, and municipal levels. To understand these governance dynamics, a range of policy documents and planning instruments were reviewed. These include the Special Spatial Plan for Chania, municipal development strategies, sustainable urban development plans, tourism management policies, heritage conservation regulations, and climate adaptation initiatives. Together, these documents provide insight into how public authorities conceptualize urban development priorities and how heritage protection is integrated—or sometimes insufficiently integrated—within broader planning agendas. The policy analysis focused on several key aspects. First, it examined the regulatory framework governing historic areas, including building regulations, conservation guidelines, and land-use restrictions applicable to the Old Town. These regulations aim to safeguard the architectural and cultural value of historic buildings but can also create administrative complexities when applied within rapidly evolving urban environments.

The analysis explored the relationship between tourism development policies and heritage conservation objectives. In many Mediterranean cities, tourism is a major driver of economic growth, but it can also generate significant pressures on historic districts. By examining policy documents related to tourism promotion, infrastructure investment, and cultural programming, the research assesses whether current strategies adequately balance economic benefits with the long-term preservation of cultural heritage. The policy review considered the extent to which climate adaptation strategies address the vulnerabilities of historic urban areas. As coastal Mediterranean cities face increasing risks associated with sea-level rise, extreme heat, and water scarcity, it is important that climate resilience measures are incorporated into heritage management frameworks. The analysis therefore evaluated whether local planning policies recognize these environmental risks and provide mechanisms for integrating climate adaptation into conservation practices. Policy analysis also highlights issues of institutional coordination and governance fragmentation. Heritage management responsibilities are often distributed across multiple governmental bodies, including municipal planning departments, national cultural heritage authorities, and regional development agencies. This institutional complexity can lead to overlapping responsibilities, regulatory inconsistencies, and delays in decision-making. Understanding these governance dynamics is essential for assessing the feasibility of implementing integrated planning approaches such as the Historic Urban Landscape framework.

The third methodological component of the research consists of qualitative data collection through semi-structured interviews with key stakeholders involved in heritage management, urban planning, tourism development, and community representation. Interviews provide valuable insights into how different actors perceive the challenges facing Chania's historic urban landscape and how they interpret the effectiveness of current governance arrangements. Semi-structured interviews were selected as the primary qualitative data collection method because they allow for both consistency across respondents and flexibility to explore emerging themes during the conversation. An interview guide was developed to address several key topics, including perceptions of tourism pressure, challenges in heritage conservation, governance coordination, climate risks, and opportunities for more integrated planning approaches. Participants were selected through purposive sampling, targeting individuals with direct knowledge or professional involvement in urban development and heritage management. The interview sample included urban planners, conservation architects, municipal officials, tourism entrepreneurs, representatives of local cultural organizations, and community leaders. This diversity of perspectives was essential for

capturing the multi-actor nature of heritage governance in historic cities. The interviews revealed a range of experiences and viewpoints regarding the management of Chania's historic urban landscape. Municipal officials highlighted the difficulties of balancing economic development objectives with heritage conservation requirements, particularly in the context of strong tourism demand. Heritage professionals emphasized the need for stronger regulatory enforcement and improved coordination between planning and conservation authorities. Tourism stakeholders discussed the economic importance of visitor activity while also acknowledging concerns about overcrowding and infrastructure pressures. Community representatives and residents raised issues related to housing affordability, loss of residential character, and limited opportunities for public participation in planning decisions. These perspectives are particularly important because they reflect the lived experience of urban change and the social consequences of tourism-driven development. Interview data were analyzed thematically, allowing recurring patterns and key concerns to emerge across different stakeholder groups. This qualitative analysis provides a deeper understanding of the institutional, social, and political dimensions of heritage management, complementing the spatial and policy analyses described earlier.

The combination of spatial analysis, policy review, and stakeholder interviews enables a comprehensive examination of Chania's historic urban landscape from multiple analytical perspectives. While spatial analysis reveals the physical patterns of urban change, policy analysis provides insight into the institutional frameworks guiding development, and interviews capture the perceptions and experiences of actors directly involved in these processes.

By integrating these methodological approaches, the research seeks to identify both structural challenges and emerging opportunities for implementing the Historic Urban Landscape approach within the Greek planning context. This multi-method strategy also allows the study to bridge the gap between theoretical frameworks of heritage resilience and the practical realities of urban governance. Ultimately, the methodological design supports the broader objective of the study: to explore how historic urban landscapes can be managed in ways that simultaneously protect cultural heritage, support sustainable economic development, strengthen community resilience, and address the environmental challenges facing Mediterranean cities.

5. CASE STUDY: THE HISTORIC CITY OF CHANIA

The historic city of Chania, located on the northwestern coast of Crete, is one of the most culturally significant urban centers in Greece and the Mediterranean. With a continuous settlement history spanning several millennia, the city represents a layered historic urban landscape shaped by successive civilizations. These historical influences have contributed to the spatial organization, architectural character, and cultural identity of the city. Chania therefore provides a valuable case study for examining the relationship between heritage conservation, urban development, tourism pressures, and environmental vulnerability in Mediterranean historic cities.

The earliest settlement dates to the Minoan period, when the area functioned as the important city of Kydonia. Archaeological evidence indicates that development was concentrated around Kastelli Hill, a strategic elevated site overlooking the harbor. Although much of the Minoan city remains buried beneath later construction, its archaeological significance continues to influence conservation policies in the historic center. Major transformations occurred during the Venetian period (1204–1645), when the Republic of Venice developed Chania into an important maritime and commercial hub. The Venetian

harbor, along with extensive fortifications, arsenals, and public buildings, shaped the compact urban form that still characterizes the Old Town (Fig.2).

Figure 2 Representation of Chania during the Venetian period

Following the Ottoman conquest in 1645, new architectural and cultural elements were introduced, including mosques, hammams, and traditional houses with wooden balconies and courtyards. These additions enriched the city's cultural diversity. During the nineteenth and twentieth centuries, urban expansion, modernization, wartime destruction, and post-war reconstruction further transformed Chania's urban fabric, sometimes introducing architectural forms that did not fully respect the historic character of the city.

These reconstruction processes produced a complex urban landscape in which modern buildings coexist with structures from earlier historical periods. While several restoration initiatives successfully rehabilitated important monuments and historic neighborhoods, other developments prioritized rapid rebuilding and economic growth. Consequently, the contemporary city presents a diverse architectural environment that reflects both historical continuity and the disruptions of modern urbanization (Dimelli, 2021). From the perspective of heritage management, this layered historical development presents both opportunities and challenges. On the one hand, the coexistence of multiple historical periods within a relatively compact urban area enhances the cultural richness and tourism appeal of Chania's historic center. Visitors encounter a diverse urban landscape where different historical narratives are expressed through architecture, public spaces, and urban morphology (Doxiadis Associates, Roikos, Lionis, & Pavlaki, 2017). On the other hand, the presence of multiple historical layers complicates conservation strategies and planning decisions. Efforts to preserve architectural elements from one period must consider the significance of later additions and transformations, which may themselves hold cultural value. Heritage management therefore requires careful evaluation of how different historical layers interact within the broader urban landscape (Petrou, 2017).

At the same time, the historic city of Chania faces increasing pressures related to tourism growth, infrastructure demands, and environmental change. Tourism development has intensified economic activity in the Old Town, particularly around the Venetian harbor, leading to the proliferation of hospitality services, commercial establishments, and short-term accommodation rentals. While tourism contributes significantly to the local economy, it also places considerable strain on historic buildings, public spaces, and municipal infrastructure (Dimelli, 2022)

These challenges highlight the importance of adopting integrated planning frameworks, such as the Historic Urban Landscape (HUL) approach, which seek to balance heritage conservation with sustainable urban development (UNESCO, 2011) By conceptualizing historic cities as dynamic socio-spatial systems shaped by cultural, environmental, and economic processes, the HUL framework offers a valuable tool for managing urban change while preserving the historical identity of places like Chania (Bandarin, & Van Oers, 2012). In this context, the historic city of Chania provides an insightful case for exploring how Mediterranean historic cities can respond to contemporary pressures while safeguarding their cultural landscapes for future generations.

6. RESULTS

The analysis of spatial data, policy documents, and stakeholder interviews revealed several critical issues influencing the management and resilience of Chania's historic urban landscape. The findings highlight four key thematic areas: institutional fragmentation in governance structures, tourism-driven transformations of land use, increasing climate-related vulnerabilities, and the emergence of innovative practices that integrate sustainability with heritage conservation. These findings illustrate the complex interactions between governance systems, socio-economic dynamics, and environmental pressures that shape the future of historic Mediterranean cities.

One of the most significant findings concerns the fragmented governance framework responsible for heritage conservation and urban planning in Chania. The research revealed that several administrative bodies are involved in decision-making processes related to heritage protection, spatial planning, tourism management, and environmental policy. These institutions often operate within separate regulatory frameworks and institutional mandates, resulting in limited coordination and inconsistent implementation of planning policies.

In Greece, cultural heritage protection is largely administered by the Ministry of Culture and Sports, while urban planning and development policies fall under municipal and regional authorities. Tourism development is influenced by both national tourism strategies and local economic development initiatives, while environmental and climate policies are governed through separate administrative channels. Although each of these policy domains plays a critical role in shaping the urban landscape, their lack of coordination often complicates efforts to develop integrated strategies for managing historic urban areas. Stakeholder interviews confirmed that this fragmentation frequently leads to bureaucratic delays, overlapping regulations, and difficulties in implementing coordinated planning interventions within the historic center. Projects involving the restoration or adaptive reuse of historic buildings often require approvals from multiple authorities, including planning departments, heritage agencies, and environmental regulators. This multi-layered approval process can significantly slow down urban regeneration initiatives and discourage investment in heritage rehabilitation.

These findings are consistent with broader international research suggesting that effective heritage management requires integrated governance structures capable of bridging institutional boundaries (Bandarin, & Van Oers, 2012). The Historic Urban Landscape (HUL) approach emphasizes the need for collaborative governance frameworks that align cultural heritage policies with urban planning, environmental management, and socio-economic development strategies (UNESCO, 2011). In the case of Chania, however, the absence of strong cross-sectoral coordination mechanisms remains a significant barrier to the implementation of such integrated planning models.

The second major finding relates to the significant impact of tourism development on land-use patterns and socio-economic dynamics within Chania's historic center. Tourism has

become a central component of the local economy, attracting large numbers of visitors to the Venetian harbor and surrounding historic districts. While this activity generates substantial economic benefits for local businesses and municipal revenues, it has also led to considerable spatial and social transformations. Spatial analysis indicates that tourism-related activities are highly concentrated within the Old Town, particularly around the Venetian harbor and major cultural landmarks. Over time, many traditional residential buildings have been converted into short-term rental accommodations, boutique hotels, restaurants, and commercial establishments serving the tourism sector. This process has significantly altered the functional structure of the historic center. One of the most notable consequences of this transformation is the decline in long-term residential populations within the historic neighborhoods. Interviews with local residents and community representatives revealed concerns regarding rising housing costs and the increasing scarcity of affordable housing options. As property owners prioritize tourism-oriented uses that generate higher economic returns, many long-term residents are gradually relocating to other areas of the city.

These dynamics reflect broader processes of tourism-driven gentrification observed in many historic cities worldwide, where the rapid expansion of visitor economies can disrupt traditional community structures and weaken social cohesion. In addition to demographic changes, tourism growth also places pressure on urban infrastructure and public spaces. During peak tourist seasons, the narrow streets and limited public squares of Chania's Old Town experience high levels of congestion, while municipal services such as waste management, water supply, and transportation systems face increased demand. The findings therefore highlight the need for balanced tourism management policies that safeguard the economic benefits of visitor activity while protecting the social sustainability and residential character of historic urban areas.

A third key finding concerns the growing exposure of Chania's historic urban landscape to climate-related risks. As a coastal Mediterranean city, Chania is particularly vulnerable to environmental changes associated with global climate change. The research identified several major risks, including coastal flooding, extreme heat events, and seasonal water shortages, all of which have implications for both cultural heritage preservation and urban resilience. The historic harbor area is particularly vulnerable to coastal flooding and sea-level rise, which may threaten historic waterfront buildings, public infrastructure, and tourism-related facilities. Increasing storm intensity and wave action (Fig 3) may accelerate the deterioration of coastal structures and historic fortifications.

Figure 3 The harbor during winter

Extreme heat events also represent an emerging challenge for the historic center. Dense building patterns, limited vegetation, and narrow streets contribute to the urban heat island effect, intensifying heat exposure during summer months. Such conditions not only affect residents' health and comfort but may also influence visitor experiences and tourism patterns. Water scarcity during peak tourism seasons constitutes another significant environmental concern. Increased water demand associated with visitor activity places pressure on municipal water supply systems and surrounding ecosystems. Similar challenges have been documented across Mediterranean island regions where tourism demand and climate variability intersect (Postma, Papp , & Koens, 2018)

Despite these emerging risks, the policy analysis revealed that climate adaptation strategies remain only partially integrated into heritage conservation planning. International research increasingly emphasizes the importance of incorporating climate resilience into heritage management frameworks to protect historic urban landscapes from future environmental shocks (Dimelli, 2021). The findings from Chania suggest that further efforts are needed to maintain climate considerations within local planning and conservation practices.

Despite the structural challenges identified above, the research also identified several promising initiatives that demonstrate opportunities for more sustainable and integrated heritage management practices. These initiatives suggest that incremental progress is being made toward aligning urban development with the principles of the Historic Urban Landscape framework.

One particularly positive development is the increasing adoption of adaptive reuse strategies for historic buildings. Rather than demolishing or abandoning aging structures, several projects in Chania have successfully rehabilitated historic properties while introducing new functions compatible with contemporary urban needs. In many cases, these projects incorporate energy-efficient technologies, improved building insulation, and sustainable materials, demonstrating that heritage conservation can be combined with environmental sustainability goals.

Adaptive reuse is widely recognized as a key strategy for sustainable heritage management, as it extends the life cycle of existing buildings while reducing the environmental impacts associated with new construction. Additional positive initiatives include community-oriented cultural programs and local heritage events, which help strengthen residents' engagement with the historic urban landscape. Such activities encourage a broader understanding of heritage as a living cultural resource rather than simply a tourism commodity.

Furthermore, stakeholder interviews indicated that municipal awareness of climate-related risks to heritage is gradually increasing, creating opportunities for future policy innovation. Although comprehensive climate adaptation strategies have not yet been fully implemented, discussions surrounding sustainable urban development and heritage resilience are becoming more prominent within local planning debates. Overall, these emerging practices suggest that while Chania faces significant governance, environmental, and socio-economic challenges, there is also growing recognition of the need for integrated and sustainable approaches to managing historic urban landscapes.

7. DISCUSSION

The findings of this study underscore the necessity of conceptualizing historic cities as socio-ecological-technical systems, wherein architectural heritage, environmental dynamics, infrastructural networks, and social structures are deeply intertwined. This perspective aligns with contemporary scholarship emphasizing the multilayered nature of urban heritage, where

interventions in one domain often produce cascading effects across others (Bandarin, 2006), (Muminović, Radosavljević, & Beganović, 2020)

Chania exemplifies the ways in which historic urban landscapes are subject to cumulative pressures arising from tourism, climate change, and socio-economic transformation. The spatial concentration of tourism in the Old Town, combined with a fragmented governance system, illustrates how economic incentives can inadvertently undermine the social cohesion and cultural integrity of historic neighborhoods (UNESCO, 2016) . Similarly, climate-related risks, including coastal flooding, heatwaves, and water scarcity, present emergent challenges that traditional conservation approaches are ill-equipped to manage (Meerow, Newell, & Stults, 2016)

The Historic Urban Landscape (HUL) framework offers a conceptual and operational pathway for reconciling heritage conservation with contemporary urban challenges (UNESCO, 2016)). By shifting the focus from isolated monuments to interconnected urban systems, HUL encourages holistic strategies that integrate cultural, environmental, social, and economic considerations. In Chania, the incremental application of HUL principles—through adaptive reuse projects, community-based cultural programming, and initial climate risk assessments—demonstrates the potential for heritage-led urban resilience (Bandarin, & Van Oers, 2012).

Nevertheless, successful implementation of the HUL approach is contingent on institutional reforms and cross-sectoral collaboration. Fragmented governance, bureaucratic silos, and limited participatory mechanisms hinder the ability of local authorities to coordinate heritage, planning, and environmental objectives effectively. These challenges echo findings from other Mediterranean contexts, where municipal capacities, regulatory overlaps, and stakeholder engagement deficits limit integrated heritage management Addressing these gaps requires the establishment of coordinated governance platforms that bring together planners, heritage authorities, environmental engineers, and community representatives. Such arrangements facilitate adaptive decision-making, ensure policy coherence, and enable urban interventions that respect both historic integrity and contemporary needs. (Diekmann & Gillot, 2010)

The study also highlights the critical role of community participation in supporting sustainable heritage outcomes. Resident engagement enhances social legitimacy, strengthens local stewardship of heritage resources, and mitigates adverse social effects of tourism and gentrification (UNESCO, 2008) . Participatory approaches, including community heritage councils, participatory mapping, and structured consultation mechanisms—have proven effective in fostering inclusive heritage governance in other European historic cities (Harrison, 2013; Aubert et al., 2019). In Chania, such mechanisms remain underdeveloped, but the emerging interest in cultural programming and localized heritage initiatives points toward a gradual shift toward more socially integrated urban management.

Finally, integrating climate adaptation strategies into heritage planning is essential for long-term urban resilience. The case study demonstrates that conservation efforts alone are insufficient to safeguard historic urban landscapes under increasing environmental pressures. Adaptation measures—including flood risk assessments, resilient infrastructure, heat-mitigating urban design, and sustainable water management—can complement heritage preservation, ensuring both the protection of cultural assets and the continued functionality of urban systems (Dimelli, 2021).

In summary, the Chania case illustrates that effective historic urban landscape management requires a multi-dimensional approach. Heritage, environment, socio-economic dynamics, and governance must be considered as part of an interconnected system, with interventions designed to balance conservation, development, and resilience objectives. This integrated perspective provides a model for Mediterranean cities facing similar pressures and highlights the broader applicability of HUL principles in contemporary urban planning.

Historic urban landscapes across the Mediterranean are increasingly exposed to intersecting pressures from climate change, tourism growth, and socio-economic transformation. The case of Chania illustrates that these pressures cannot be addressed through traditional, sectoral approaches to heritage conservation alone. Instead, integrated planning frameworks, particularly the Historic Urban Landscape (HUL) approach, provide a pathway toward more resilient, sustainable, and socially inclusive urban management.

Understanding historic cities as complex socio-ecological-technical systems is essential for effective urban heritage management. In such systems, heritage assets, infrastructure networks, social structures, and environmental processes interact dynamically, producing both opportunities and vulnerabilities (Bandarin, & Van Oers, 2012) . This perspective enables planners and policymakers to anticipate the cascading effects of urban interventions, from tourism-driven property conversions and public space commercialization to climate-induced flooding and heat events, ensuring that strategies are responsive to both immediate pressures and long-term urban dynamics.

Governance and institutional coordination are fundamental to the successful implementation of HUL principles. In Chania, fragmented responsibilities among heritage authorities, municipal planning departments, tourism regulators, and environmental agencies have historically limited the potential for integrated action. Establishing cross-sectoral collaboration, participatory governance mechanisms, and clearly defined institutional roles is necessary to facilitate information sharing, joint decision-making, and adaptive management. These arrangements allow heritage policies to be aligned with broader urban planning and environmental objectives, enhancing the resilience of historic urban systems.

Tourism presents both opportunities and challenges for historic urban areas. While tourism contributes significantly to local economic activity, it also imposes spatial and social pressures, including the conversion of residential properties into short-term rentals, the displacement of long-term residents, and the commercialization of public and cultural spaces. Sustainable management of tourism requires policies that balance economic benefits with community needs, protect social cohesion, and ensure equitable distribution of resources, thereby preventing the erosion of neighborhood identity and social networks (Diekmann & Gillot, 2010)

Climate adaptation represents a critical dimension of heritage management in Mediterranean cities. Historic districts are increasingly vulnerable to coastal flooding, extreme heat events, and water scarcity, particularly during peak tourism seasons. Integrating climate risk assessments into conservation planning, implementing resilient infrastructure designs, and adopting nature-based solutions can safeguard both built heritage and urban functionality. Measures such as heat-mitigating urban materials, water-saving interventions, and retrofitted energy systems can protect historic assets while enhancing the resilience of urban communities (Dimelli, 2021)

Adaptive reuse and community engagement offer additional pathways toward sustainable heritage management. Retrofitting historic buildings with energy-efficient technologies, water-saving systems, and environmentally responsible infrastructure preserves architectural authenticity while accommodating contemporary urban needs. Complementing these physical interventions with participatory initiatives—such as community heritage councils, neighborhood workshops, and participatory mapping—fosters local stewardship and ensures that heritage management reflects the knowledge, priorities, and values of residents.

The Chania case study demonstrates that heritage conservation, urban development, and environmental sustainability are mutually reinforcing when guided by an integrated, system-level approach. Historic cities can adapt to contemporary socio-economic, environmental, and tourism pressures while maintaining cultural identity and social cohesion. The HUL

framework offers practical tools for achieving this integration, emphasizing the interconnectedness of heritage assets, urban systems, governance, and community dynamics.

Ultimately, the lessons from Chania suggest that Mediterranean historic cities can enhance resilience and sustainability through coordinated governance, meaningful participatory processes, and adaptive, system-oriented planning. By aligning heritage preservation with climate adaptation, socio-economic development, and sustainable tourism strategies, cities can navigate the complex challenges of the twenty-first century while safeguarding the cultural and social fabric that defines their unique urban landscapes.

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