JOURNAL OF BALKAN ARCHITECTURE

Spatial Resilience of Historic City Centres in the Face of Climate Change: A Comparative Study of Selected Balkan Cities

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PROJECT PRESENTATION

DOI: https://doi.org//10.69648/NAVW2332

Journal of Balkan Architecture (JBA), 2026; 3(1): 31-48

jba.ibupress.com

Online ISSN: 2955-2524

Application: 13.03.2026

Revision: 16.04.2026

Acceptance: 08.05.2026

Publication: 15.05.2026

Ercanli, C. (2026). Spatial resilience of historic city centres in the face of climate change: A comparative study of selected Balkan cities. Journal of Balkan Architecture, 3(1), 31-48

https://doi.org//10.69648/NAVW2332

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The paper was presented at the 10th Urban Studies Congress, Skopje, North Macedonia. I declare no conflicts of interest.

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Abstract

The threats to historic city centres are mounting due to climate change, which affects their densely packed cultural heritage resources, aging infrastructure, and multifaceted governance systems. In fact, they are extremely sensitive environments, as they have little room for manoeuvre, and must perform two tasks that, for the most part, appear to be conflicting tasks: conservation and climate transformation. This paper focuses on the spatial and institutional robustness of five historic city centres in the Balkan states – Skopje, Mostar, Prizren, Belgrade, and Thessaloniki – in the face of climate challenges such as extreme heat, floods, and long-term drought. The study assesses how well climate adaptation and cultural heritage protection are integrated in space and policy, and pinpoints the main barriers and entry points for heritage- attuned resilience planning. The paper follows an interpretative, multi-scalar approach comprising policy and planning documents analysis, spatial mapping, and comparative evaluation. The analysis focuses on three aspects at once: nature-based solutions, participatory governance, and cultural heritage in climate-resilience strategies. The results show significant variability among the cases. While some cities are making headway with green infrastructure and disaster risk reduction programs, others continue to face institutional fragmentation, insufficient financing, and weak coordination. In all the cases, lore about culture was at best peripheral to climate adaptation agendas, and often represented as a passive good rather than one of adaptive capacity. The research develops an integrative, place-based resilience approach that considers tangible and intangible heritage in climate adaptation processes. By analyzing a previously neglected subnational context, this research adds practical and policy-relevant knowledge for those dealing with historic urban landscapes.

Keywords: historic city centers, cultural heritage resilience, climate adaptation strategies, Balkan cities, urban climate vulnerability

BALKAN JOURNALS

Introduction

Climate change and its effects pose a threat, especially to cities with rich cultural heritage, inadequate and under-maintained infrastructure systems, and limited adaptive capacity, that is, those that cannot respond rapidly to negative impacts. These historical cities are exposed to effects such as extreme temperatures, floods, sea level rise, and drought. These cities are also places of collective memory through their historical and contemporary building stock, cultural and social structures. They have developed through the accumulation of tangible and intangible cultural heritage rather than through standardized planning approaches. Such cities have to develop a compromise between the preservation of their form over time, constant morphogenetic adaptation, and transformation pressures. Hence, adaptation strategies that combine matters of conservation and transformation capacity are required (Fatorić & Seekamp, 2017; Aktürk & Hauser, 2025).

In this sense, the Balkan region provides an ideal terrain for researching climate resilience in historic cities. While one can find cultural heritage or cultural diversity in Balkan cities, it is difficult to find positive governance and financial stability. Furthermore, the sensitivity of the rich historical and cultural fabric of these cities to changing conditions, such as climate instability, constitutes a hindrance to securing the long-term viability of the cities. While there are many studies in the literature on urban climate resilience, research that provides a comparative analysis addressing the relationship between cultural heritage and climate adaptation in Balkan cities is limited. There is a lack of research and information on how climate change adaptation and heritage protection intersect spatially and institutionally with historically and culturally rich urban fabrics. This research addresses this gap in the literature by comparatively analyzing five historical city centers in the Balkan geography: Skopje (North Macedonia), Mostar (Bosnia and Herzegovina), Prizren (Kosovo), Belgrade (Serbia), and Thessaloniki (Greece). These cities come from different climatic risk levels and cultural and geographical diversity, management and planning traditions, and a great cultural heritage, which allows for good comparative analyses. The objective of this paper is basically an evaluation of the way strategies for adaptation to climate change are being integrated into the conservation of cultural heritage at spatial and institutional dimensions. Three major criteria will take part in the assessment: nature-based solutions, participatory governance, and heritage-sensitive planning approaches. It has identified cultural heritage as a possible resource for building sustainable urban areas in the Balkans.In so doing, the paper positions climate resilience in the architectural and spatial conditions of Bal-

kan historic city centres, partaking in debates on Balkan architecture/urbanness. It promotes a place-based resilience approach that acknowledges cultural heritage as an enabler for adaptive and sustainable urban futures in the Balkans.

Theoretical Framework and Literature Review

Cultural change management deals with the long-term vulnerabilities of culture to values amidst natural and human-induced stressors. In this respect, the frameworks of UNESCO, ICOMOS, IUCN, and ICCROM are very relevant. These approaches develop methodologies in the process of assessing risks from disasters to heritage and World Heritage Sites—at that. This includes several methodological tools in the plans for risk reduction and preparedness. These studies clearly articulated the imperative of preservation of heritage value notwithstanding conditions of environmental stress (Valagussa et al., 2021; Aktürk & Hauser, 2025). UNESCO's '*Disaster Risk Management for World Heritage*' (2010) report noted that disaster risk reduction has not been fully incorporated as part of the heritage management practice. Therefore, cultural heritage falls under the broader disaster risk management systems. Similarly, risk mitigation principles take a secondary place in the policies of conservation of heritage (Aktürk & Hauser, 2025).

Urban resilience is already established as the core analytical tool in climate change adaptation studies, conceptualizing the capacity of urban systems to resist, respond, and recuperate from environmental, social, and economic perturbations (Meerow et al., 2016; Cao, 2023). This definition implies that resilience cannot be evaluated by using infrastructure-centric solutions. Resilience is a situated virtue , not a technical capacity. The durability of spatial resilience in the long term is determined not only by armouring but also by how cultural heritage is safeguarded, and social relations and place identity are sustained. UN-Habitat (2020) discloses that resistance strategies for historic urban landscapes could not rely on material actions alone but had to be balanced with architectural continuity and the socio-cultural principles inherent within the morphology. This way of thinking also distorts how interventions relate to the spatial character of the city. UNESCO's '*Historic Urban Landscape*' (HUL) approach (2011) complements this framework and argues for the active integration of cultural values, sense of place, and community traditions within planning processes. Spatial resilience must be pursued through the integration of the physical environment with a city's social, institutional, and regulatory frameworks rather than through piecemeal strate-

gies (Jigyasu, 2016; Ripp et al., 2024).With the changing climate, heritage is under more and more pressure. Deterioration of material, which can be slow and gradual over time, is among the most obvious consequences of this. Flood events, in turn, pose a great threat to structures. Extreme temperature-related thermal stress places a heavy strain on vulnerable structural components (Fatorić & Seekamp, 2017; Tringa et al., 2025). These effects demonstrate that climate risks in heritage sites are increasingly becoming more complexly organized. Climate risk will need to be factored into inheritance planning decisions earlier. But physical exposure can often explain vulnerability on its own; institutional capacity, bureaucratic rules, and policy compliance also heavily influence this condition. This shows that risk is a technical issue, but also a managerial one. Internationally, immediately recognizable cultural heritage has started to emerge as a significant international commodity. Yet it remains marginal within climate politics frameworks (Orr et al., 2021). Heritage's (cultural) place in many climate policy debates is still a poor second. The IPCC (2022) recognises loss of heritage as one of the major non-economic impacts of climate change and highlights the implications of such loss on social identity and cultural continuity. Changes in place identity, however, are often marginal and change over time. UNESCO (2022) urges better integration of the climate and cultural-historical agendas. But this appeal is not in equal measure heard in practice, especially in resource-poor and transitional regions. And so there is a gap between global goals and local practices, and in the process, the global goals prove to be incompatible with local practices. The approach to climate resilience in historic towns and cities is no longer focused solely on technical interventions; NbS and participatory governance are emerging as more important options. This change is a dramatic shift in attitude. The difference with this kind of solution is that it can include within social processes technical measures. Adapted to the context, nature-based solutions can be very effective in historical locations. These solutions promote climate adaptation. There is more one can do with these techniques to help historic areas. Green roofs, urban wetlands, and blue-green infrastructure are illustrations of such practice (Raymond et al., 2017; Liu et al., 2025; Marzio et al., 2025). However, this ability depends on the nature of the application. The participatory planning processes that are developed can do so in a way that enlists the support of local stakeholders in its own decision-making processes. Such participation often strengthens and makes the tensions of conservation-urban-transformation more manageable (Mehr & Wilkinson, 2020; de Manuel et al., 2025; Zarei & Shahab, 2025). In contrast, top-down management strategies are typically ignorant of local knowledge. The omission of local participation also un-

dermines the success and the sustainability of adaptation efforts (Jing et al., 2025; Parsons et al., 2025). Although the body of global studies is increasing, Southeast Europe is still marginal in scholarship on the convergence of climate resilience and heritage conservation. Cities in the Balkans are often situated within fragmented governance patterns where environmental planning and heritage protection are separated institutionally and strategically (Cotella & Toto, 2021; Vulevic et al., 2021). Historical legacies of conflict, decentralisation, and uneven European integration further complicate cooperation and limit capacity for delivery (Cierco Gomes, 2019; Knez et al., 2022; Pajvančić-Cizelj, 2025). Through a cross-city analysis of Balkan cases and their responses to converging climate/heritage pressures, this article advances a more contextual and regionally grounded conceptualisation of spatial resilience in culturally-significant urban landscapes.

Methodology

This paper applies a qualitative and multi-sourced methodology to investigate the spatial resilience of historic city centres in the context of climate change. Concentrating on a limited number of case cities, the study combines systematic document analysis and spatial mapping with a comparative analysis of climate adaptation and cultural heritage at the local level. Cases were selected using purposive criteria: the existence of historically significant urban cores, vulnerability to climate-related hazards, such as heatwaves and floods, diversity in governance planning systems, and availability of pertinent policy-related documents and spatial data. This selection technique permits the examination of wider regional trends and, at the same time, can go deeper into city-specific inquiries. The key data includes national and city-level policy documents, climate action and adaptation strategies, and heritage management plans. Documents were analysed in order to identify the degree of convergence between climate resilience and heritage preservation agendas. The spatial analysis drew upon open-access geographic information system (GIS) data from sources such as the Copernicus Urban Atlas and other municipal datasets to map climate vulnerabilities and adaptation-related activities in historic urban contexts. Moreover, secondary sources, such as peer-reviewed academic literature, project reports, and grey literature, were employed to provide context to the findings and enhance the analysis. The analysis is centered on three spatial resilience aspects: (1) the application of nature-based solutions within or proximate to historic districts, (2) participatory governance at the targeted community level in adaptation planning, and (3) the embedding of cultural heritage in the climate resil-

ience agenda. Results for each case city and overall result for each dimension were assessed using a qualitative evaluation matrix specifically designed for this study and labeled low, moderate, and high. The study also notes there are several limitations, such as data availability differing across cases, linguistic limitations, and the lack of primary data collection, such as interviews. However, the foilation of documentary analysis, spatial data, and secondary sources strengthens the rigor, validity , and richness of the findings.

Case Studies: Historic City Centres in the Balkans

This part outlines a brief comparison of five historic centres in Southeast Europe through the concept of spatial resilience in a changing climate. The chosen case studies illustrate a variety of geographical, cultural, and institutional settings within the Balkan region, providing a sophisticated analysis of how historic urban landscapes may cope with climate-related challenges. The focus of this analysis is on three interconnected components that are key to conceptualising resilience in urban contexts rich in heritage. The analysis focuses on the nature-based solutions (NbS) in the historic cities or in near proximity to the historic city centres, taking into account mitigation of the climate risks, while considering heritage values. Secondly, it assesses the availability and effectiveness of tools for participatory governance, especially for the involvement of local grassroots actors and other stakeholders in the processes of planning for climate adaptation and resilience. Finally, it assesses how briefly cultural heritage is mentioned in climate resilience plans (including planning instruments, policy frameworks, and local interventions). Each case study is analysed by applying the qualitative analytical framework presented in the methodology, based on a synthesis of policy analysis, spatial mapping, and secondary data. This permits both within-case and cross-case analysis to identify similarities and differences in the manner in which spatial resilience is articulated among the five selected Balkan historic city centers.

Skopje (North Macedonia)

The historic core of Skopje presents a fragmented form of climate-resilient city making, predominantly defined by long-term aftershock of post-earthquake rebuilding and institutional coordination (City of Skopje, 2018; Rajkovchevski & Dorevski, 2019; World Bank Group, 2024). The area is particularly prone to flash flooding in the Vardar River corridor, and to rising heat stress induced by compact urban form and inadequate green infrastructure provision (City of Skopje, 2018a). While nature-based solutions to the acknowledged climate-associated risks are

referenced in city-level planning documents, these have limited integration with heritage-focused planning regimes. Participatory governance at all levels is also weak and mainly project-based, subject to external funding rather than secured within institutional frameworks. Considerations of cultural heritage are almost invisible in climate adaptation strategies, with little or no coordination between resilience development and heritage management. Skopje is a city that can be described as having a low to medium level of spatial resilience, which is a result of institutional complexity on the one hand, and the growing silencing of cultural heritage in the local climate (in) action on the other (Donevska, 2017; Popovski & Sterijovski, 2024).

Mostar

The old town of Mostar is recognized within the UNESCO World Heritage framework and is at risk from climate hazards such as river flooding, rising temperatures, and extended drought. Despite the internationally stated heritage protection, climate adaptation measures are inconsistent and largely based on projects (Makaš, 2011; World Bank, 2023; Popovac et al., 2024). Implementation of NbS is limited and mostly reactive, focusing on water-sensitive interventions along the corridor of the Neretva River. Participatory governance mechanisms exist but are often best channelled through international and NGO actors rather than being institutionalized locally. The city's intricate post-conflict governance structures also make it more difficult to coordinate environmental and heritage management. As a result, the spatial resilience level of Mostar is moderate, with the residents indicating a strong symbolic recognition of cultural heritage but a weak perception of including heritage into climate change adaptation (Djurasovic & Knieling, 2015; Meteoblue, 2025).

Prizren

The historical centre of Prizren is characterized by its intact urban fabric from the Ottoman period and a unique cultural character that was subjected to various vulnerabilities, among them climate vulnerabilities, such as floods and heat stress (Jagxhiu, 2011; Municipality of Prizren, 2022). Climate adaptation planning is in its infancy, and the development of appropriate institutional arrangements has been hampered by limited human resource capacity and financial constraints. The use of nature-based solutions is very limited and pretty much restricted to maintaining existing green areas without any introduction of proactive/transformative adaptation solutions. Even though community-led cultural production and civil

society participation have some visibility, these modes of operation have not yet achieved any substantive linkages to official climate governance and planning frameworks. Considerations of cultural heritage are hardly ever included in city climate plans, leading to limited synergy between heritage preservation and urban resilience planning. In this sense, Prizren reflects a limited spatial resilience, emphasizing the necessity of enhanced multilevel coordination and the advocacy for heritage-sensitive climate change approaches (Municipality of Prizren, 2022; UNICEF, 2024).

Belgrade

Belgrade has introduced a series of climate–resilience policies, notably concerning flood risk management and urban greening measures along the Sava and Danube river corridors. These initiatives are reflective of relatively high institutional capacity and increasing reliance on nature-based solutions in urban climate organisation (Green City Action Plan for City of Belgrade, 2021; SECAP, 2021). Nevertheless, adaptation is seldom tailored to the unique spatial, material, and symbolic qualities of the old city centre, and integration between climate and heritage conservation planning is weak. While participatory governance is formally acknowledged in planning documents, the process of decision-making remains predominantly top-down, thereby limiting effective stakeholder participation. Protection of cultural heritage is primarily operative as an independent policy field, and as such, only a fraction of resilience approaches are incorporated. Belgrade is an example of moderate spatial resilience, with a strong technical culture despite limited heritage-sensitive adaptation (City of Belgrade, 2015; Kapović Solomun et al., 2025; Radić Sibinović et al., 2025).

Thessaloniki

Among the case studies, Thessaloniki exhibits the highest level of incorporation of climate resilience strategies in a historic urban setting. The city has been an active participant in international resilience networks as well as in European Union-funded programmes, allowing it to implement NbS solutions in the form of green roofs, blue-green infrastructure, and solutions for urban cooling (Lionello & Scarascia, 2018; IUCN, 2019; City of Thessaloniki, 2020). Participatory governance arrangements are relatively more developed, although their success is mixed across projects and institutional arrangements. The protection of cultural heritage, which includes Roman, Byzantine, and Ottoman layers of urbanism, is also being woven into climate resilience and urban regeneration processes, especially in the

historic upper town. Though problems with long-term financial security and continuity of execution plague most efforts, the city of Thessaloniki demonstrates a moderate to high level of resilience potential and provides promising practices for heritage-adapted climate change across the Balkans (Yiannakou & Salata, 2017; ISCI, 2019; Tringa et al., 2025). The five case studies together highlight common regional trends as well as city-specific dynamics in spatial resilience patterns shaping historic urban cores across the Balkans. The institutional capacity of the cities is different, and so are their governance structures and level of exposure to climate hazards, but shared concerns can be identified, among them the low mainstreaming of cultural heritage into climate adaptation policy environments, the uneven application of nature-based solutions (NBS), and weak or fragmented forms of participatory governance. They also show how resilience outcomes are not only determined by physical vulnerability, but also by policy coherence and institutional coordination. In order to synthesize the results and to allow a systematic comparison, the following figure and table show a qualitative evaluation of each city along the three analytical dimensions. This multi-case research is good to find commonalities and disparities between the cases and leads us to the spatial resilience in Balkan historic city centres analysis in chapter four.

Findings and Comparative Analysis

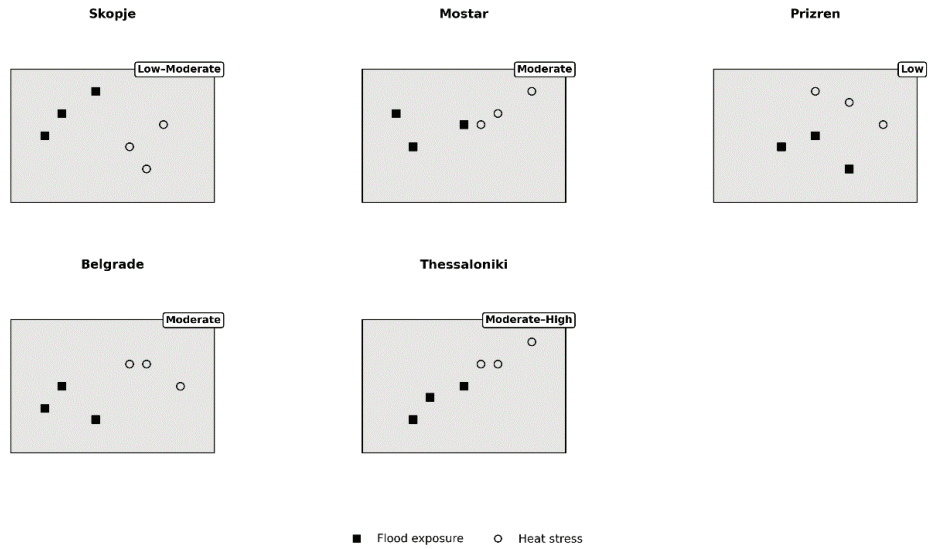
Figure 1 and Table 1 concisely present a comparative evaluation of spatial resilience for each of the five historic city centres. Whereas Figure 1 represents relative levels of flood exposure and heat stress in historic cores and dense urban areas, Table 1 presents the qualitative basis for the resilience types in the form of governance, nature-based solutions, and integration of heritage. The comparison between five historic city centres showcases shared regional challenges and divergent resilience outcomes influenced by governance capacity, planning cultures, and approaches to heritage integration. Meeting qualitative assessments with the schematic spatial patterns presented in Figure 1, the analysis points out how climate- related risks interrelate with institutional and spatial conditions in Balkan historic urban areas. Flood exposure and heat stress exist in all case studies (Figure 1), but their spatial patterns and associated resilience differ widely. Cities like Skopje and Prizren show greater relative vulnerability due to the high concentration of climate hazards in their small historic cores and their designation as low or low – moderate in resilience. Here, profound nature-based solution implementation markets, participatory governance practices, and cultural heritage are marginalised in cli-

mate adaptation concepts and plans. Measures for climate resilience still appear as disjointed and definitely not in tune with both the material and symbolic vulnerability of historic urban tissues. Mostar and Belgrade are placed in an intermediate category, a level of sensitivity moderately high for relative resilience. As can be seen in Figure 1, both cities show some reduction of climate risks with flood control measures and urban greening measures. However, these are frequently run completely separately from heritage conservation agendas. In Mostar, post-conflict governance fragmentation and dependence on externally generated projects constrain long-term cooperation, and in Belgrade, top-down planning approaches obstruct the effective mainstreaming of heritage within climate resilience strategies. Thessaloniki turns out to be the most developed case, with a medium-high resilience to climate-generated risks. As shown in Figure 1, the historical centre shows a spatially more balanced flood exposure, heat stress, and adaptive measures. This relative performance can be attributed to stronger institutional capacity, better access to European Union (EU) policy frameworks and funding instruments, and more engagement with international resilience agendas. EU membership has enabled the take-up of nature-based solutions and aided the gradual alignment of cultural heritage into resilience-focused urban regeneration projects via strategic planning and cross-sectoral planning. Yet long-term financial and implementation feasibility concerns remain, suggesting that while governance enhancement is capable of reducing operational and governance barriers, it does not eliminate them completely.

Overall, the comparative analysis highlights a general regional trend that cultural heritage is mainly regarded as a passive asset and not an active source of urban resilience. Climate adaptation, heritage conservation, and participatory governance are still unevenly aligned, indicating there is a need for integrative, place-based models. With its depiction of relative levels of vulnerability and resilience, Figure 1 therefore lends support to the argument that successful climate adaptation in historic city centres is reliant upon physical risk reduction and institutional rigour in conjunction with heritage-sensitive modes of planning.

Figure 1

Comparative climate-related risk patterns and relative resilience levels in Balkan historic city centres



Note. The spatial distribution of flood exposure and heat stress is schematic and indicative. The locations are derived from a synthesis of city-level risk assessments, policy documents, and illustrative mapping conducted for each case study. They do not represent precise geospatial measurements but are intended to highlight relative patterns of vulnerability for comparative analytical purposes.

Table 1

Comparative assessment of spatial resilience dimensions in selected Balkan historic city centres

City	Nature-based Solutions	Participatory Governance	Heritage Integration in Resilience Planning
Prizren	Low	Moderate	Low
Skopje	Moderate	Low	Low
Mostar	Moderate	Moderate	Moderate
Belgrade	Moderate	Moderate	Moderate
Thessaloniki	High	Moderate-High	Moderate-High

Note. Assessments are based on qualitative analysis of policy documents, spatial mapping, and secondary sources, and indicate relative rather than absolute levels of resilience.

Discussion

The results of the research show that vulnerability in historic city centres goes well beyond the physical exposure to climate-related hazards and includes institutional fragmentation, governance weaknesses, and the further marginalization of cultural heritage in climate adaptation agendas. As shown in the cross-case analysis in Figure 1 and Table 1, variations in resilience among the cases regarding spatial exposure to flooding and heat stress are as much a function of policy coherence and governance capacity as they are of overexposure to fluvial and heat hazards. It calls into question prevailing resilience approaches in which heritage is understood predominantly as a static asset to protect rather than as an enabler of adaptive potential. Instead, the findings support a developing conceptual lens that sees cultural heritage as a facilitator of resilience through contribution to social connectedness, place-based identity, and adaptive spatial governance (Mochizuki et al., 2018). But this remains a largely untapped potential across the Balkans' cases. Heritage is often treated separately from climate adaptation planning, which restricts its ability to guide spatial-scape, nature-based solutions, and community mobilisation. From a policy perspective, the findings highlight a need to realize that including heritage in climate resilience planning is not simply a case of technical retrofitting or generic nature-based solutions. Participatory, cross-sectoral, and

culturally informed governance models have been identified as crucial to effective adaptation within historic urban fabric (McGill, 2020). While the '*UNESCO Historic Urban Landscape*' (HUL) approach (UNESCO, 2011) can offer an appropriate conceptual basis to aid such holistic approaches to integration, the case study analysis demonstrates how this can be operationalized to a limited extent in the context of the Balkans. Planning processes across donors and institutional barriers continue to stifle heritage-sensitive resilience planning that is long-term. In doing so, by placing its analysis in the relatively neglected region of Southeast Europe, a region deeply affected by post-conflict governance patterns, uneven decentralization, and economic restrictions, this paper adds to the scholarly discussions on heritage-sensitive climate governance. The comparative insights highlighted both barriers and potential avenues. Thessaloniki showcases the ability to enhance adaptive capacity through greater coordination at the institutional level and gradual mainstreaming of heritage into resilience-focused urban regeneration, while Prizren's community-based cultural projects underscore the significance of local agency even in conditions of severely limited formal capacity. Together, these results highlight the fact that resilience in old city cores is not about defending the space of the inherited built environment, but rather about the strategic use of cultural heritage as an enabler for inclusive, adaptive, and forward-looking urban policies. This discussion provides the theoretical foundation for the conclusions, which outline operational avenues for mainstreaming cultural heritage within climate resilience regimes at local and regional levels.

Conclusion

This paper assesses how five historic urban cores in the Balkans cope with the dual contemporary problems of climate risk and cultural heritage preservation. Results show that while cultural heritage is contributing in varying degrees to the enhancement of climate resilience in urban policy on the local level, its inclusion into frameworks of climate adaptation is not consistent, is fragmented, and, to a great extent, reactive in terms of. As in other places, although Thessaloniki possesses relatively developed governance capacity and spatial strategies, the concrete application of heritage-sensitive climate adaptation is far from fully realized. In other case studies, more deep-seated barriers remain, such as weak institutional ability, poor cross-sectoral coordination, and ongoing dependency on short-term, donor-led projects. Resilience in the context of historically layered urban environments, thus, cannot be achieved only through technical or infrastructural

solutions, is the message emerging from this project. Instead, adaptive capacity is driven by the coming together of place-based, institutional, and socio-cultural elements (including collective memory, identity, and indigenous knowledge) that are often rendered invisible within mainstream accounts of adaptation planning. To fill these gaps, sectoral methodologies are needed to transcend, and cultural heritage should be considered as a core factor in urban resilience rather than a constraint to it. Based on the comparative lessons learnt from the case studies, the research advocates for a place-based resilience approach that mainstreams climate adaptation and fits within the heritage management framework. The analysis also identified the following key priorities: enhancing institutional coordination among heritage, environmental and planning sectors, and mainstreaming heritage into climate change adaptation and disaster risk reduction; supporting context-sensitive nature-based solutions that are compatible with the tangible and intangible attributes of historic environments; promoting community engagement, including by strengthening governance to facilitate community participation in co-developing adaptation strategies; developing interdisciplinary expertise of those working at the interface of climate and heritage; and, creating flexible funding mechanisms that support integrated environmental and cultural actions. Regional cooperation within Southeast Europe would be necessary as well to promote peer learning and the transfer of good practice. Filling a critical gap in the research on climate resilience and heritage in the Balkan region, this study presents both theoretical and practical implications for academics, policy makers, and practitioners. In the end, historic city centres' long-term resilience in the face of mounting climate stressors is about inclusive governance, institutional synergism, and the adaptive capacities inherent in cultural heritage as a vehicle for community and place identity. Therefore, heritage mainstreaming in climate resilience plans is no longer a demand but a prerequisite to guarantee the cultural continuity and urban functionality of ancient cities in the years to come.

References

Aktürk, G., & Hauser, S.J. (2025). Integrated understanding of climate change and disaster risk for building resilience of cultural heritage sites. Nat Hazards 121, 4309–4334. https://doi.org/10.1007/s11069-024-06970-x

Cao, H. (2023). Urban resilience: Concept, influencing factors, and improvement. Frontiers in Business, Economics and Management. 9, 343-346. 10.54097/fbem.v9i1.8777.

Cierco Gomes, T.M.R. (2019). The European Union accession and climate change policies in the Western Balkan countries. In: Sequeira, T., Reis, L. (eds.) Climate Change and Global Development. Contributions to Economics. Springer, Cham. https://doi.org/10.1007/978-3-030-02662-2_8

City of Belgrade. (2015). Climate adaptation action plan and vulnerability assessment. (Nataša Đokić, Miodrag Grujić, Eds.). ISBN 978-86-912029-2-7.

City of Skopje. (2018, August 05). Resilient Skopje. Climate Change Strategy. https://zivotnasredina.skopje.gov.mk/proekti/otporno-skopje/

City of Skopje. (2018a, August 10). Thermal map of Skopje: the hottest points in the city and measures to cope. Environmental Portal. https://zivotnasredina.skopje.gov.mk/termalna-mapa-na-skopje-najtoplite-tochki-vo-gradot-i-merki-za-spravuvane/

City of Thessaloniki. (2020). Resilient Thessaloniki: A strategy for 2030. https://resilientcitiesnetwork.org/downloadable_resources/Network/Thessaloniki-Resilience-Strategy-English.pdf

Cotella, G., & Toto, R. (2021). Foreword: Territorial governance in the Western Balkans: Multi-Scalar approaches and perspectives. European Spatial Research and Policy, 28(2), 5-20.

de Manuel, B. F., Peña, L., Berreteaga, A., Diosdado, B., Laso, J., & Ametzaga-Arregi, I. (2025). Nature-based solutions for urban challenges: A simple framework based on ecosystem services for a World Heritage City. Ecosystem Services, 74, 101746.

Djurasovic, A., & Knieling, J. (2015). Urban transition and sustainability. The case of the city of Mostar, Bosnia and Herzegovina. Eastern Journal of European Studies, 6(1), 5.

Donevska, N. (2017). Trade-offs in sustainable urban development: The case of Skopje. Journal of Environmental Studies and Sciences, 7(1), 152-159.

Fatorić, S., & Seekamp, E. (2017). Are cultural heritage and resources threatened by climate change? A systematic literature review. Climatic Change, Springer, 142(1), 227-254.

Green City Action Plan for the City of Belgrade (GCAP). (2021). Retrieved August 10, 2025, from https://ebrdgreencities.com/assets/Uploads/PDF/Belgrade-GCAP.pdf

IPCC (ed.) (2022) Climate Change 2022: impacts, adaptation and vulnerability. Contribution of Working Group II to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change. pp.: Cambridge University Press, Cambridge, UK and New York, NY, USA, 3056.

ISCI. (2019, August 05). City Characterisation Report: Thessaloniki. https://sustainability-coalition.org/publication/city-characterisation-report-thessaloniki/

IUCN. (2019). Nature-based solutions in Mediterranean cities. Rapid assessment report and compilation of urban interventions (2017-2018). Malaga, Spain: IUCN. 117. https://iucn.org/sites/default/files/2022-07/rapid_assessment_med_nbs_cities_jan19v2.pdf

Jagxhiu, B. (2011). The challenges of urban development case study–Prizren.

Jigyasu, R. (2016). Reducing disaster risks to urban cultural heritage: Global challenges and opportunities. Journal of Heritage Management. 1, 59-67. 10.1177/2455929616649476

Jing, B., Zaremohzzabieh, Z., Abdullah, H., Ahrari, S., Gill, S. S., Rosnon, M. R., & Ma'rof, A. A. (2025). Why communities withdraw: A multilevel analysis of participation barriers in climate governance and sustainable development in rural China. Sustainable Futures, 10, 101501.

Kapović Solomun, M., Eremija, S., Bogunović, I., Hysa, A., Češljar, G., Čigoja, I., & Ferreira, C. S. (2025). Nature-based solutions mainstreaming: Challenges and opportunities for climate-related natural hazards mitigation in Western Balkan countries. South-east Eur for, 16(1), 73-84.

Knez, S., Štrbac, S., & Podbregar, I. (2022). Climate change in the Western Balkans and EU green deal: Status, mitigation, and challenges. Energ Sustain Soc, 12(1). https://doi.org/10.1186/s13705-021-00328-y

Lionello, P., & Scarascia, L. (2018). The relation between climate change in the Mediterranean region and global warming. Regional Environmental Change, 18(5), 1481–1493.

Liu, Y., Zhao, J., Ikram, R. M. A., Tan, S. K., & Wang, M. (2025). Strategic planning for nature-based solutions in heritage cities: Enhancing urban water sustainability. Water, 17(14), 2110.

Makaš, E. G. (2011). Rebuilding Mostar: International and local visions of a contested city and its heritage. In On location: Heritage cities and sites, 151-168. New York, NY: Springer New York.

Marzio, S., Tosi, J., Poggi, F., & Amado, M. (2025). Nature-based solutions for urban waterfront regeneration: a systematic review of frameworks, strategies and applications. City and Environment Interactions, 100281.

McGill, R. (2020). Urban resilience: An urban management perspective. J Urban Manag, 9(3), 372–381. https://doi.org/10.1016/j.jum.2020.04.004

Meerow, S., Newell, J.P., & Stults, M. (2016). Defining urban resilience: A review. Landscape and Urban Planning, 147, 38-49, ISSN 0169-2046. https://doi.org/10.1016/j.landurbplan.2015.11.011

Mehr, S. Y., & Wilkinson, S. (2020). The importance of place and authenticity in adaptive reuse of heritage buildings. International Journal of Building Pathology and Adaptation, 38 (5): 689–701. https://doi.org/10.1108/IJBPA-01-2020-0005

Meteoblue. (2025, August 01). Climate change – Mostar, Bosnia and Herzegovina. https://www.meteoblue.com/en/climate-change/mostar_bosnia-and-herzegovina_3194828

Mochizuki, J., Keating, A., Liu, W., Hochrainer-Stigler, S., & Mechler, R. (2018). An overdue alignment of risk and resilience? A conceptual contribution to community resilience. Disasters, 42(2), 361–391. https://doi.org/10.1111/disa.12239

Municipality of Prizren. (2022). Intervention plan for rural development to mitigate and adapt to climate change 2023 – 2028. https://www.undp.org/sites/g/files/zskgke326/files/2023-05/Development%20to%20Mitigate%20and%20Adapt%20to%20Climate%20Change%20of%20Municipality%20of%20Prizren.pdf

Orr, S. A., Richards, J., & Fatorić, S. (2021). Climate change and cultural heritage: A systematic literature review (2016–2020). The Historic Environment: Policy & Practice, 12(3-4), 434-477.

Pajvančić-Cizelj, A. (2025). European urban networks as an aspirational horizon of Europeanization in the Balkans. Urban Research & Practice, 18(4), 513-534.

Parsons, M., Godden, N. J., Henrique, K. P., Tschakert, P., Gonda, N., Atkins, E., ... & Crease, R. P. (2025). Participatory approaches to climate adaptation, resilience, and mitigation: A systematic review. Ambio, 1-16.

Popovac, M. R., Halilović-Terzić, S., & Kopilaš, V. (2024). Adaptation of public and private buildings and spaces through different historical and socio-political circumstances—case study Mostar. In International Symposıum: New Metropolitan Perspectives, 358-368. Cham: Springer Nature Switzerland.

Popovski, V., & Sterijovski, B. (2024). Enhancing nature-based solutions in North Macedonia.

Radić Sibinović, M., Brković Dodig, M., & Million, A. (2025). Vertical gardens in public open spaces—nature-based solutions for sustainable urbanization in Belgrade City, Serbia. In Nature-Based Solutions for Urban and Peri-Urban Areas: For Resilient and Sustainable Urbanization, 123-144. Singapore: Springer Nature Singapore.

Rajkovcevski, R., & Dorevski, Z. (2019). Local adaptation strategy plan for the city of Skopje: Resilience climate change adaptation plan. https://eprints.uklo.edu.mk/id/eprint/7287

Raymond, C.M., Berry, P., Breil, M., Nita, M.R., Kabisch, N., de Bel, M., Enzi, V., Frantzeskaki, N., Geneletti, D., Cardinaletti, M., Lovinger, L., Basnou, C., Monteiro, A., Robrecht, H., Sgrigna, G., Munari, L., & Calfapietra, C. (2017). An impact evaluation framework to support planning and evaluation of nature-based solutions projects. Report prepared by the EKLIPSE Expert Working Group on Nature-based Solutions to Promote Climate Resilience in Urban Areas. Centre for Ecology & Hydrology, Wallingford, United Kingdom.

Ripp, M., Egusquiza, A., & Lückerath, D. (2024). Urban heritage resilience: An integrated and operational definition from the SHELTER and ARCH projects. Land, 13(12), 2052.

SECAP. (2021). Sustainable energy and climate action plan for the city of Belgrade. https://mlgp4climate.com/uploads%2FMLGP%20Library%2FSECAP%20Examples%2FBelgrad%20%C5%9Eehri%20SECAP.ing.pdf

Tringa, E., Georgoulias, A. K., Akritidis, D., Feidas, H., & Zanis, P. (2025). Assessing the future risk of damage to European cultural heritage due to climate change. Heritage, 8(5), 175.

Tringa, E., Tolika, K., Tsoka, S., Anagnostopoulou, C., & Kostopoulou, E. (2025). Assessing future changes in heating and cooling degree days using multiple base temperatures for cultural heritage sites in Greece: A case study of Thessaloniki and Delphi. Science of The Total Environment, 977, 179352.

UNESCO. (2011). Urban heritage for resilience. Consolidated Results of the Implementation of the 2011 Recommendation on the Historic Urban Landscape. https://whc.unesco.org/en/documents/204294

UNESCO.(2010, July 7). Managing Disaster Risks for World Heritage. https://whc.unesco.org/en/managing-disaster-risks/

UN-HABITAT. (2020). The value of sustainable urbanization. World Cities Report 2020. BM-HABITAT. https://unhabitat.org/world-cities-report-2020-the-value-of-sustainable-urbanization

UNICEF. (2024, November). A climate landscape analysis for children. https://www.unicef.org/kosovoprogramme/reports/climate-landscape-analysis-children

Urban atlas. (n.d.). Copernicus land monitoring service. https://land.copernicus.eu/en/products/urban-atlas

Valagussa, A., Frattini, P., Crosta, G., Spizzichino, D., Leoni, G., & Margottini, C. (2021). Multi-risk analysis on European cultural and natural UNESCO heritage sites. Natural Hazards, 105(3), 2659-2676.

Vulevic, A., Castanho, R. A., Gómez, J. M. N., Lausada, S., Loures, L., Cabezas, J., & Fernández-Pozo, L. (2021). Cross-border cooperation and adaptation to climate change in the Western Balkans Danube area. In Governing Territorial Development in the Western Balkans: Challenges and Prospects of Regional Cooperation, 289-308. Cham: Springer International Publishing.

World Bank Group. (2024). Country climate and development report. Western Balkans 6 North Macedonia Country Compendium. https://documents1.worldbank.org/curated/en/099092624072036221/pdf/P17920510eb24a0561a98b1a8b00a307db2.pdf

World Bank. (2023). Heat watch. Sarajevo & Mostar, Bosnia-Herzegovina Community Heat Mapping Campaign. https://documents1.worldbank.org/curated/en/099052825225442826/pdf/P177209-e57c8744-e16a-43a0-a891-8a2b483942d8.pdf

Yiannakou, A., & Salata, K.-D. (2017). Adaptation to climate change through spatial planning in compact urban areas: A case study in the city of Thessaloniki. Sustainability, 9(2), 271. https://doi.org/10.3390/su9020271

Zarei, M., & Shahab, S. (2025). Nature-based solutions in urban green infrastructure: A systematic review of success factors and implementation challenges. Land, 14(4), 818.