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Integrating Traditional Knowledge into Tourism Climate Policy: Exploring Feasibility and Benefits in Iran's World Heritage Sites

Traditional knowledge, despite its recognised socio-ecological value, is often underestimated or excluded from climate policies, particularly within tourism contexts. Using qualitative research, this study employed purposive sampling to interview sixteen participants to explore (a) the feasibility of integrating traditional knowledge into tourism climate policy in World Heritage Sites and (b) the potential benefits of such integration. Findings show that traditional knowledge can strengthen site resilience, support participatory management, and enhance climate capacity in both theory and practice, though several challenges remain. Theoretically, and grounded in environmental sociology, the study advances the current understanding of the sociocultural dimensions of tourism climate governance and advocates for epistemological pluralism and more inclusive policies that incorporate diverse knowledge systems. Practically, the evidence-based findings suggest that tourism policy should prioritize the application of community-rooted knowledge and practices, develop context-sensitive guidelines to integrate multiple knowledge systems into tourism climate actions, and disseminate effective methodologies and practices.

Keywords: *traditional knowledge, climate change, governance, tourism policy, environmental sociology, World Heritage Sites, heritage tourism*

1. Introduction

Climate change, driven by anthropocentric activities, poses a significant threat to ecosystems, human communities, and cultural heritage worldwide. The impacts of climate change are among the greatest threats to all types of World Heritage Sites, affecting Outstanding Universal Values (UNESCO, 2023). Scholars and practitioners have highlighted heritage sites' vulnerabilities to climate change over the last few decades, calling for more long-lasting policies and actions to mitigate the current and potential impacts (Xiao, Li & Seekamp, 2023; Elsen et al., 2020; Lafrenz Samuels & Platts, 2022).

A community-based management system is recommended to enhance climate resilience and adaptation for heritage sites. This system can facilitate more effective engagement with local communities to consider their epistemologies, capacities, and skills, including traditional knowledge, in climate governance (Carmichael et al., 2018; ICOMOS, 2019; UNESCO, 2023). Previous studies have addressed the interplay between climate change and traditional knowledge, emphasizing the importance of community-based strategies and calling for a deeper understanding of how traditional practices are incorporated into the formulation of climate governance and actions (Petzold et al., 2020; Sohaib et al., 2024). This discourse has also been explored more specifically within the context of World Heritage Sites and other types of protected areas, albeit on a smaller scale (e.g., Carmichael et al., 2018; ICOMOS, 2019; MacKinnon et al., 2011; Esfehani, 2016). From a different angle, tourism activity has been argued to be a multifaceted factor that can critically influence the success or failure of climate governance. If planned adequately, tourism can positively contribute to the destination's approach in tackling environmental issues, while poorly planned tourism can exacerbate the stresses caused by climate change (Gössling & Higham, 2020; UNESCO, 2007; Markham, 2016). Furthermore, climate change has the potential to adversely impact heritage tourism, thereby impeding the ability of World Heritage Sites to fulfil their defined role in delivering benefits to the communities and ecosystems that depend on them (Lafrenz Samuels & Platts, 2022).

Various policies address the interconnections among climate change, tourism, and World Heritage Sites to varying degrees. A notable example is the Policy Document on the Impacts of Climate Change on World Heritage Properties, initially adopted in 2007 and updated by the General Assembly of States Parties to the World Heritage Convention in 2023 (UNESCO, 2023). However, the current policies lack providing a comprehensive assessment of the aspects of tourism contribution in World Heritage Sites management, facing the mounting impacts of environmental uncertainties. Given that most existing policies focus on the macro level, there is a lack of operational guidance incorporating empirical practices applicable at the micro level to address climate change issues in the day-to-day tourism management of heritage sites. There is a need for serious strategic initiatives in the tourism sector to explore effective ways to mitigate the impacts of climate change on destinations, especially iconic sites like World Heritage Sites (Scott, 2021; Rastegar & Ruhanen, 2023). A critical aspect of this necessity can be addressed through a societal lens. At the same time, Lafrenz Samuels and Platts (2022) discuss the tendency in scholarly and

policy to underestimate and/or ignore the interrelation between climate change and socio-cultural mechanisms in heritage management. Following this notion and grounded in the environmental sociology approach, this study addresses a gap at the intersection of tourism in World Heritage Sites and climate change. Given the complex relationship between societies and their natural environments (Longo et al., 2021), we apply environmental sociology's theoretical frameworks to understand how sociocultural dynamics affect environmental vulnerabilities in the context of tourism.

We explore two facets of the existing gap. First, there exists a knowledge gap regarding the effective application of cultural elements, such as traditional knowledge, in the conceptualization and implementation of climate policy in heritage management. Traditional knowledge refers to the long-standing practices and wisdom originating from specific cultural and geographical contexts (Tribe & Liburd, 2016) and that present a specific community perspective (Schellhorn, 2010). As noted by ICOMOS (2019, p.10), “there are reservoirs of experience and knowledge, which have accumulated over time” that could be used and adopted in climate actions. Second, insufficient attention is paid to climate initiatives in heritage tourism (Becken *et al.*, 2020; Guix et al., 2024). Bhandari et al. (2016) found that many destinations struggle to develop effective approaches to climate action due to the lack of clear guidelines and strategies. In response to this gap, this paper addresses the need for effective tourism climate practices in heritage management, emphasizing the intersection of socio-cultural settings and climate change.

The rationale for conducting this study is to partially respond to the identified necessity and to address to part of the gaps highlighted earlier in this section This study seeks to answer the following research questions: (a) To what extent is it feasible to integrate traditional knowledge into tourism climate policy in World Heritage Sites, and (b) What potential benefits could arise from incorporating traditional knowledge into such policies? Inspired by Jewell and Cherp (2023), feasibility refers to the practical and institutional ability to carry out adaptive measures under realistic conditions. In the context of climate change, feasibility is defined as the "potential for a mitigation or adaptation option to be implemented" (IPCC, 2022 footnote 72). Benefit describes the environmental, cultural, and social gains that improve site resilience and visitor experience (Tribe & Liburd, 2016; UNESCO, 2021; Jewell & Cherp, 2023; Mandić et al., 2025). The findings add to the literature and policy around the social construct of climate change by offering insights

into the perspectives and actions taken by heritage tourism. In line with Day et al. (2020), this study's argument and findings call for a more inclusive and innovative approach to climate change governance, emphasizing the value of incorporating local community perspectives. This study presents a novel perspective on the existing gap in the literature: the under-theorized role of socio-cultural dynamics in shaping tourism responses to climate change, by situating traditional knowledge within the framework of heritage tourism climate policy.

2. Literature review

2.1 Tourism climate policy in World Heritage Sites

World Heritage Sites are unique assets recognized for their universal significance and contribution to humanity's shared heritage (Pendlebury et al., 2009). Sesana et al. (2020) discuss climate change as the most significant current threat to the majority of World Heritage Sites globally. Tourism at World Heritage Sites, while proven to be a significant socio-economic driver, often heightens pressure on existing heritage resources due to environmental changes. It is often associated with increased consumption (Khairi et al., 2019), waste generation (Hosseini et al., 2021), illegal activities (KC, 2022), disturbance of local ecosystems and land conversion (Zhang et al., 2023), and contributing to greenhouse emissions, which pose challenges for sustainable management (Higham, Cohen, & Cavaliere, 2013). Despite the accelerating pace of negative impacts, Bhandari et al. (2016) found that many tourism destinations, including heritage sites, struggle to devise effective approaches to improve climate governance due to the absence of clear strategies. Scott (2021, p.11) emphasizes that" climate action plans for tourism destinations remain rare, with some notable exceptions". This notion is particularly vital for World Heritage Sites, as the absence of an effective climate management system further worsens their vulnerability (Sesana et al., 2020). This aligns with Krajnović et al.'s (2020) call for more climate-adaptive approaches to tourism aimed at mitigating negative impacts while preserving cultural and natural heritage. Similarly, Mandić et al. (2025) highlight the importance of resilience-based policies in tourism, underscoring the vital role of community awareness and collaborative action in addressing environmental challenges.

Building on the tourism knowledge-system lens (Tribe & Liburd, 2016), tourism governance in World Heritage Sites is best understood as an interconnected network in which scientific expertise,

site management, and local knowledge collaborate to guide decision-making and adaptive management. A major limitation in current research is the insufficient integration of community-driven knowledge into heritage climate strategies (Suhaeb et al., 2024). Dominant scientific and institutional frameworks often overlook the experiential insights of traditional ecological knowledge, which provide valuable, context-specific understanding of environmental change and resilience (UNESCO, 2023). In this context, co-producing knowledge should explicitly acknowledge and adopt various ways of knowing and acting, integrating scientific, managerial, and local viewpoints. This type of inclusive collaboration improves the quality and credibility of climate strategies and ensures they are rooted in a range of social and ecological contexts (Norström et al., 2020). This approach connects global climate goals with local heritage practices through participatory co-production (Norström et al., 2020; UNESCO, 2023). Adopting a knowledge systems perspective thus allows for a more comprehensive evaluation of how climate change responses in WHS tourism can balance protection objectives with community and policy priorities.

2.2 Traditional knowledge and climate change

Research indicates that the terms used to describe community-based and indigenous systems of knowledge, including indigenous knowledge, local knowledge, and Traditional knowledge, do not have a universally accepted definition (Kihwelo, 2005; Ngulube & Onyancha, 2011; Onyancha et al., 2018). Despite widespread recognition of the significance of knowledge held by traditional and indigenous communities, scholars continue to debate its definition and conceptual boundaries. It is common for researchers to treat these terms as synonymous and use them interchangeably (Grenier, 1989). As Ngulube and Onyancha (2011) highlight, these labels are applied with varying emphasis and frequency across disciplines, reflecting the multidimensional and context-specific nature of conceptualizing, contextualizing, and applying knowledge. Moreover, the concept has been described as “multidisciplinary” (Hirwade & Hirwade, 2012, p. 240), underscoring its diverse and complex nature. Considering these considerations, ongoing scholarly discourse is necessary to achieve a more profound and more precise understanding of its scope and subject domain. Odora Hoppers (2005, p. 2) defines traditional knowledge as “the totality of all knowledge and practices, whether explicit or implicit, used in the management of socio-economic, spiritual and ecological facets of life”. While literature identifies certain characteristics associated with each term, it is

misleading to discuss them in a monolithic manner. As Butler and Menzies (2007, p. 4) observe, “there are many traditional knowledges, and each one, while it may share traits with others, reflects a unique way of understanding the world”. This body of knowledge is enacted within the specific community's social values, philosophies, and everyday activities (Bruchac, 2014). In the post-colonial era, traditional knowledge systems provide more than explanations of past practices; they inform contemporary protocols and agreements aimed at “protecting Indigenous natural resources, cultural knowledge, and intellectual property” (Bruchac, 2014, p. 3821). In this research, referring to Ngulube and Onyancha (2011), the concept of traditional knowledge is broadly defined as various forms of place-based and community-based knowledge that have been developed through ongoing interactions between people and their environments (Berkes, 2001; Butler & Menzies, 2007).

Most traditional knowledge elements share a link to the human-nature connection and to natural resource management (Robinson et al., 2021). One of the key strengths of traditional knowledge lies in its ability to foster climate resilience by offering a localized knowledge system that responds to climate change (Chen & Cheng, 2020). For example, indigenous communities in the Arctic use detailed observations of ice and weather patterns to anticipate and adapt to seasonal changes (Berkes & Jolly, 2002). Traditional knowledge also plays a significant role in disaster risk management. Communities in the South-Central Coast of Bangladesh employ protective measures, such as using geotextiles to reinforce house basements and pond banks, thereby reducing damage from floods and storm surges (Rahman et al., 2018). While Esfehani (2016) outlines the positive contribution of collective customary practices in supporting natural protected areas, other researchers have addressed the role of sociocultural settings in resource management and in mitigating conflicts caused by climate change (Mekonnen et al., 2021; Mwangi et al., 2023; Schlingmann et al., 2023).

Despite substantial evidence of its effectiveness, traditional knowledge remains marginalized in broader climate governance (Suhaeb et al., 2024). Although global frameworks such as UNESCO (2023) increasingly acknowledge its significance, a persistent gap remains between historical and theoretical recognition and its practical integration into policy frameworks capable of realizing its full potential in climate adaptation. Recent studies outline that many national adaptation strategies still lack concrete mechanisms for incorporating local knowledge into design, implementation, and

monitoring processes (Nyahunda, 2024; FAO, 2024; Prism, 2025). Consequently, scholars have documented ongoing challenges and systemic shortcomings in embedding traditional knowledge within policy and governance structures (Ajayi & Mafongoya, 2017; Mekonnen et al., 2021). A similar pattern is evident in heritage and tourism policy contexts, where community-based knowledge, despite growing recognition, remains insufficiently embedded in site management and operational strategies. UNESCO (2024) observes that local knowledge systems in heritage contexts are often undervalued, constraining the holistic integration of indigenous and local knowledge in different aspects of heritage management, like tourism and climate issues (Klemetti et al., 2017). From a heritage perspective, Serdeczny et al. (2018) argue that there is a correlation between the loss of traditional knowledge and a decrease in heritage resilience to climate change. This argument adds to the existing gap in assessing the employability of social dynamics and practices in climate policy in the heritage tourism sector.

In this context, there is growing recognition that climate change cannot be understood solely through the lens of natural sciences. While the natural sciences have made significant progress in documenting the ecological causes, the broader socio-cultural forces driving these changes remain inadequately addressed (Islam & Kieu, 2021; Longo et al., 2021). Islam and Kieu (2021) note that the creation of comprehensive climate plans, which necessitates a multidisciplinary strategy integrating social, political, and financial considerations with environmental science, has been underestimated. They highlight the need for policies to look beyond technical solutions to consider and implement social practices that can improve climate adaptation efforts.

2.3 Environmental sociology and climate change

This study employs environmental sociology as its theoretical framework to investigate the feasibility and benefits of incorporating traditional knowledge, as an integral component of the community socio-cultural setting, into tourism climate policies. The increasing recognition of climate change as a multifaceted challenge has led to a growing consensus that climate vulnerabilities are not merely scientific phenomena, but socially constructed issues influenced by cultural values, and political and historical contexts (Atzori et al., 2018; Islam & Kieu, 2021; Khan et al., 2024). Accordingly, environmental sociology provides a valuable framework for analyzing not only the structural barriers to effective action but also how social systems and cultural meanings shape environmental policies and practices (Longo et al., 2021). Within the context of

tourism, this perspective highlights how tourism operates as both a driver and reflection of broader social–environmental relations. Kousis (2000) emphasises that tourism activities can stimulate environmental and social movements, illustrating the sociopolitical dimensions of tourism development and sustainability. Similarly, Zhang, Higham, and Albrecht (2020) suggest that environmental sociology opens new territory for interpreting nature-based tourism, particularly by linking environmental ethics, cultural values, and social engagement. In this study, this approach enables a more holistic understanding of how tourism, climate policy, and traditional knowledge interact within the social and ecological fabric of World Heritage Sites.

This perspective supports the social sciences' potential to provide insights into why climate change persists as a global challenge despite decades of scientific warnings and actions (Dunlap & Brulle, 2015). As such, Gould and Lewis (2009, p.3) explain, the special focus of environmental sociology "is on how social systems are organized and change in response to the natural world, just as the changes they produce in the natural world force them to further respond and change". Focusing on reciprocal human-nature relationships, Scott (2021) argues that environmental changes not only affect ecosystems but also reshape social structures, cultural heritage, and economic activities, and thereby human responses to environmental challenges.

In this study, environmental sociology provides a valuable lens for examining how traditional knowledge can serve as a resource for addressing climate change. By focusing on the socio-cultural aspects of heritage management, this theoretical framework allows for understanding how participants perceive the feasibility and benefits of integrating traditional knowledge into heritage tourism policy in the context of climate change. This approach facilitates a more holistic, contextually grounded analysis of traditional knowledge's capacity to contribute to climate governance in heritage tourism.

3. Methodology

3.1 Research design

We employed an interpretative methodology, which emphasizes individuals' understanding and interpretations of a social phenomenon (Goodson & Phillimore, 2004). This study aimed to explore participants' lived experiences and direct accounts, grounded in their daily interactions within

place-based cultural contexts and climate impacts. Therefore, this research design prioritizes qualitative methods to capture participants' nuanced perspectives. This method allows for a deeper understanding of how traditional knowledge intersects with climate initiatives, moving beyond purely technical and scientific considerations to incorporate community wisdom and engagement (Lerski, 2025). Given that this is a multidisciplinary study exploring the integration of three discourses, traditional knowledge, climate policy, and heritage tourism, an interpretative methodological approach was deemed suitable. This approach is grounded in the interpretive paradigm, which aims to reveal "culturally derived and historically situated interpretations of the social lifeworld" (Crotty, 2015, p. 67), which aligns with the methodological objective of this study.

In-depth semi-structured interviews were conducted to explore the participants' understanding and interpretations of the subject. This approach provided the data collection space with enough time and flexibility for the participants to express their views and real-life experiences in their own words, grounded in detailed accounts of the context (Cresswell, 2013).

3.2 Data sampling and analysis

We interviewed sixteen individuals who possess substantial personal and/or professional and/or educational familiarity with the research (Table 1). We used purposive sampling to select interviewees with backgrounds, suggesting they were well-informed and experienced in discussing key research areas. Two inclusion criteria guided participant selection. First, participants were required to have familiarity with at least one World Heritage Site in Iran, where tourism is a component of the site's daily operations. Second, participants needed relevant educational or professional expertise in at least two of the following areas: environmental science and climate change, tourism, social science, or cultural studies and folklore.

At the initial stage of the research design, the study aimed to adopt a broad perspective on World Heritage Sites in Iran. However, during data collection, it became evident that participants were more strongly connected to only five specific sites. Consequently, the empirical data are predominantly centered on these five sites. (Appendix 2). Eight participants were directly involved with one of these sites, representing government, community, or research agencies, the private

sector, or non-profit bodies, while the remaining participants had prior professional or academic connections with the sites. (Table 1)

More importantly, the sampling strategy aimed to include individuals with substantial familiarity with the local community and authentic experience and understanding of the region's traditional lifestyles and livelihoods. This aligns with the characteristics of traditional knowledge as a communal and cumulative body of knowledge passed through generations using local resources (Butler & Menzies, 2007). Of the sixteen participants, eleven were born in the local community and maintained strong ties with their cultural setting. All these communities have traditionally resided within or in proximity to locations that are now designated as World Heritage Sites. The remaining five participants, while not born in the community, demonstrated a strong familiarity with the local cultural context through long-term residence, work, and personal engagement with community lifestyle and traditions.

The purpose of sampling was initiated by approaching the potential contacts that the research team suggested based on their previous professional experience with tourism and heritage contexts. We began with a group of five participants and used the snowball sampling technique, continuing recruitment until data saturation was reached, at which point no new insights or themes emerged (Bowen, 2008).

The questionnaire was divided into two categories of questions; the first comprises five questions on the initiative's feasibility. The second category asked three questions on the benefits foreseen for various stakeholders, like the community, business, and officials (Appendix 1). The feasibility section of the interview guide was structured to assess five key aspects: participants' overall views on the possibility of applying traditional knowledge to climate adaptation in World Heritage Sites; the practical engagement of tourism actors (e.g., tourists, eco-lodges); the presence of any successful examples; the extent to which existing policies address traditional knowledge; and suggested pathways for strengthening its integration into tourism and climate planning. The benefits section explored three dimensions: the potential advantages for site conservation, tourism development, and local communities; the role of traditional knowledge in raising awareness among different stakeholders; and its broader contribution to supporting World Heritage areas through more informed and inclusive climate decision-making.

In general, participants from private businesses, such as ecolodge owners, had greater flexibility in their schedules, enabling longer, more detailed interviews. In contrast, interviews with officials and academics were typically shorter due to their limited availability. Overall, the interviews averaged approximately one hour and fifteen minutes in duration. All participants were positive about participating in interviews, as it provided a flexible opportunity for them to express their situations and concerns related to the study scope. All interviews were conducted online and recorded using Outlook Teams Meeting. To ensure all information was captured, the first author took notes during the conversation.

We used thematic network analysis, a method commonly applied to interview transcripts (Walters, 2016), to explore nuanced understandings of the empirical material within an interpretivist paradigm (Braun & Clarke, 2006). As a foundation, we used the five-phased model of thematic analysis developed by Attride-Stirling (2001) and Braun and Clarke (2006); however, given the cross-language nature of this study, we found the adapted model developed by Esfehani and Walters (2018) more practical. Focusing on the unavoidable requirement for translating non-English data into English and discussing the possible challenges the researchers face, Esfehani and Walters (2018) suggest that translation from the original language (Persian in this study) to English be conducted between phases two and three of the thematic analysis frameworks. Taking the translation as an “internal procedure within the thematic analysis process" (p.3166), they suggest the translation happens “after the researcher has gained familiarity with the empirical material and has identified the codes using the source language" (Esfehani & Walters, 2018, p. 3166). This supports Squire’s (2009) argument that conducting most of the analysis in the source language before translating the main themes into English is a robust methodological approach in qualitative studies. The applied process to conduct thematic analysis in this cross-language study was; verbatim transcription of the empirical material (pre-Phase 1), gaining a trustworthy familiarity with text (Phase 1), repeated reading to identifying codes and translating the emerged codes while moving from Phase 2 to Phase 3 (Phase 2), development of basic themes and reviewing the translated codes and themes (Phase 3), consolidate into organizing themes (Phase 4) and derive global themes and networks (Table 3). The researchers' bilingual proficiency in Persian and English, as well as their familiarity with the target society, were highly beneficial for the analysis process.

To enhance the trustworthiness and credibility of the study, we implemented several strategies. First, following the recommendation of Kitto et al. (2008), the analytical process involved the participation of four experienced researchers to ensure the incorporation of diverse perspectives. Second, the researchers engaged in regular peer debriefings, where they critically examined their own assumptions, further strengthening the overall research process. Our prior familiarity with the study location enhanced the study by providing a deeper understanding of the context and easier access to participants (Yip, 2024). However, aligning with a reflexive approach, we acknowledged that this familiarity could introduce assumptions to mitigate this influence; thus, we implemented strategies adapted from Goundar (2025). The research team regularly reviewed and revised the pre-agreed analytical framework to ensure its continued appropriateness and rigor. Also, we discussed various aspects and stages of the research with peers who had no connection to the project, which helped us remain focused on developing a rigorous, contextually grounded approach. Engaging with impartial reviewers allowed us to examine our assumptions and ensure the study maintained a strong methodological foundation throughout the research process.

(Table 1: Participants' Profile)

3.3 Background and Rationale for Case Selection

Iran, home to 28 UNESCO World Heritage Sites, provides a compelling context for examining the intersection of society, tourism, and climate policy. The country faces significant challenges in preserving its cultural and natural resources under increasing climate pressures. At the same time, Iran's long history of adaptive practices rooted in traditional wisdom offers valuable knowledge and strategies for climate resilience (Hashemi et al., 2017). For example, Qanats, an ancient water management system of underground channels transporting water to arid regions, represent a sustainable adaptation to environmental constraints (Abadi et al., 2023), while Bad-Girs (Windcatchers) harness natural airflow for cooling, reducing reliance on energy-intensive systems (Amanat, 2016).

From a tourism perspective, examples such as Qanats demonstrate the potential for integrating traditional knowledge into climate action while providing economic and cultural benefits (Abadi et al., 2023). Nevertheless, current tourism and climate policy frameworks in Iran have yet to fully embrace the social and cultural dimensions of these practices, limiting their institutional

integration. As a Global South country highly vulnerable to climate change due to its arid/semi-arid climate and socioeconomic conditions (UNDP, 2024), Iran illustrates both the opportunities and challenges of linking local knowledge with sustainable tourism governance.

All the sites in this study are UNESCO-designated; however, as in many developing countries, Iran faces resource constraints and management challenges that limit full compliance with UNESCO requirements (UNESCO, n.d.). Centralized governance, financial limitations, and restricted community participation contribute to a gap between policy design and implementation (Taghilou & Aftab, 2022; Jowkar et al., 2016). This study did not focus on specific World Heritage Sites; instead, a holistic perspective was adopted, with data collected from participants possessing diverse experiences and knowledge across multiple sites, enabling broad insights into the intersection of cultural heritage, tourism, and climate policy

4. Findings

Two main themes under the feasibility factor and three main themes under the benefit factor emerged from data analysis. The following section and Figure 1 present the themes.

(Figure 1: Key themes and findings)

4.1 Feasibility

The participants were asked to explain how feasible it is to integrate traditional knowledge into tourism climate policy and if adequate regulatory resources existed to support this initiative. Two main themes emerged from the data: (a) cultural capacity factor, and (b) policy factor.

Cultural capacity factor. Participants acknowledged that the cultural depth and diversity of traditional knowledge in an old country like Iran, with a long history of human inhabitants, is considerable. A wide array of examples from different regions were brought up that have been employed throughout history to adapt and deal with environmental changes. Different examples of water management techniques were repeatedly reported. [P16] said:

"*Some regions present a richer and more diverse traditional practices due to the historical need for them…however, you probably can find the traces and elements of traditional lifestyle and wisdom almost everywhere in Iran, especially in rural areas where people still have closer interaction with natural resources."*

While the participants acknowledged the sufficient cultural capacity to be incorporated in climate initiatives, they also broadly reflected on the limitations of the practical application of traditional knowledge in identifying technical solutions and the need for modern technology and scientific intervention. [P3] said, "Some *of the old techniques are not practicable in our modern world unless they are somehow modified and adjusted to the current requirements*". One of the highlighted examples was that modern technology alongside the traditional practices should be used in preserving and strengthening built monuments to "*ensure the long-term effectiveness of the traditional architectural methods against environmental changes*" [P9], "*accelerate the whole process of adopting the current requirement like energy saving in old buildings*" [P3], and "*increase the site practicality and appeal for tourism*" [P8].

Policy factor. Although it was agreed that ample traditional knowledge can potentially be incorporated into climate initiatives, a concern was raised that "*there is no comprehensive regulation or protocol to guide the heritage tourism authorities on how to use the local traditional know-how against environmental challenges*" [P11]. Additionally, it was emphasized that any policy and regulatory decisions must foster a community involvement approach in heritage management. [P1] stated, *"This approach should aim to consult local members as the historical owners and carriers of traditional practices in designing operational response to climate."* [P15] explained:

"Heat, dust, and flooding are major challenges for us. We often hear those authorities are developing policies, but local business owners want to be included in these discussions. Our families have lived in this area for generations, and we have traditional tools and techniques that could be useful for both policymakers and the wider community."

Additionally, it was discussed that the sustained implementation of traditional knowledge in tourism will likely facilitate more effective engagement of the locals in day-to-day onsite climate activities. [P1] explained:

"Members of my community are the intellectual owners of this collective wisdom… they are the people who need to be asked about the historical implications of these old techniques in dealing with environmental issues and reducing their impacts on our daily life and our businesses…I believe this approach creates a better collaboration between the community and officials and will lead to better results… the community will be happier as well."

4.2 Benefits

The participants were keen to discuss the benefits of incorporating traditional knowledge into heritage tourism climate policy and support their claim with real-life examples rooted in their professional and personal experiences. The prospective benefits were assessed in three groups (a) innovative and diverse approach, (b) tourism, and (c) climate capacity building.

Innovative and diverse approach. The integration of traditional knowledge into climate policy in World Heritage Sites was recognized as an approach that can provide stakeholders with varied ways to adapt to environmental changes, especially if combined with modern science. Modern science and technology were argued as "*useful but not always practical in heritage sites…traditional wisdom, which has been tested for centuries, can offer add-on knowledge and complementary techniques… they are community driven and often more nature-based or even low-cost*" [P13].

Designated as a World Heritage Site in 2017, the City of Yazd, situated in the heart of the Iranian plateau, stands as a remarkable example of how humans and nature have coexisted in a desert environment through the intelligent management and efficient use of scarce resources (WHC.UNESCO, 2024). The unexpected harsh flood in Yazd in 2021 appeared to be a popular example among the interviewees. The flood damaged the historical sites, tourism businesses, and infrastructure, like boutique hotels and the old Bazar. There was a strong concession between the participants that the severity of damage the flood left behind "*demonstrates the value of traditional water management systems and local architectural methods, which were not taken seriously by*

the authorities in the last few decades and in developing adaptation actions" [P9]. The participants widely discussed that incorporating traditional practices into Yazd's heritage tourism management could have mitigated the severity of the impacts. [P2] explained:

"*The old techniques whose practicality and effectiveness in hot and dry climates have been proven over centuries could have potentially been integrated into building restoration, surface water drainage, ground steepness, architectural materials, and new buildings' orientation to reduce the flood strength and damage in the city downtown, which is the heart of the Yazd World Heritage territory*."

[P4] believed that "*applying traditional knowledge gives the planners and policymakers the opportunity to enhance their understanding of the current climate situation, diversify their applied methods and test other solutions, rather than relying too heavily on modern engineering"*. Yazd was discussed broadly as an example demonstrating how the integration of multiple knowledge systems into modern planning can enhance the resilience of heritage sites and reduce their vulnerability to environmental change.

Tourism. It was discussed that traditional knowledge, if planned and presented in an adequate way, can enhance visitor experiences and promote heritage sites' attractiveness in the tourism market. It also diversifies typical tourism activities by displaying knowledge-based narrations linked to social constructs of the destination, like local lifestyles, livelihood, and folklore. Participants suggested that material heritage and physical infrastructure related to traditional knowledge "*could be leveraged to create unique and more meaningful offerings to the visitors*" [P14]. Youth and foreign visitors were mentioned as two groups with a greater willingness to learn about this area. [P5] explained, "*They [youth and foreigners] like to learn how these old techniques have successfully been applied to help people, nature, and towns survive over time*". [P4] A local guide explained that "*tourists often ask us if they can visit the traced vineyards …they find the old agricultural techniques in design and management of terraced gardens very interesting"*.

[P3] who runs a desert ecolodge said,

"Tourists who stay with us often ask what our water supply is in such a dry environment. This usually leads to engaging conversations about Iranian traditional water management

practices…We have included visits to Qanats in local tours, as we know that tourists find this unique experience particularly interesting."

Climate capacity building. Capacity building is widely acknowledged as a central element in climate adaptation and reducing risk among stakeholders (Shaw et al., 2009). This study implements Nautiyal and Klinsky's (2022, p.576) narration to define capacity building in the climate context as "plural forms of knowledge, meaningfully engaging a diverse range of actors, including local and indigenous peoples and using transdisciplinary and holistic approaches". Applying to this narration, the data analysis emphasizes the necessity of raising tourism stakeholders' understanding about the role of cultural settings in combating climate issues, which could lead to enhancing climate capacity through education and awareness. [P8] stated, "*I believe by telling the visitors about the traditional practices, we would be providing indirect education to the tourism sector about how our culture can support the ecosystem*". This awareness also needs to engage the tourism policy body as [P6] stated, "*those who plan tourism and climate change in heritage sites must be fully familiar with ways that community-based knowledge can support the site's resilience in fighting the current threats like deforestation and water shortage".*

[P12] explained:

Policymakers often lack awareness regarding the advantages that traditional ways of life can offer to modern life. This perspective often stems from insufficient education of the younger generation… Recently, the municipality [of Hawraman World Heritage Site] has initiated a program, inviting elderly and retired community members with expertise in traditional agricultural and building practices to share their knowledge with officials...This type of initiative must be practiced more often in all aspects of heritage management, including climate actions.

5. Discussion and Conclusion

This study aims to contribute to a deeper understanding of incorporating traditional knowledge into tourism climate policy in World Heritage Sites. It presents a novel perspective to address the existing gap in literature: the under-theorized role of socio-cultural dynamics in shaping tourism responses to climate change, by situating traditional knowledge within the framework of heritage tourism climate setting. Rather than treating the findings as a simple endorsement of traditional

knowledge, the discussion below interprets them as evidence that the feasibility and value of traditional knowledge in heritage tourism climate policy depend on how cultural capacity, institutional support, and multi-knowledge governance are brought into alignment.

This study shows that the feasibility of incorporating traditional knowledge into tourism climate policy in World Heritage Sites is not determined simply by whether such knowledge exists, but by whether cultural resources and governance structures can be aligned. Although the findings confirm that many local communities possess longstanding place-based knowledge relevant to climate adaptation, they also reveal that this knowledge remains difficult to operationalize when heritage tourism policy lacks clear regulatory pathways for its inclusion. In this sense, the frequently observed absence of comprehensive climate policy in heritage tourism, identified by Bhandari et al. (2016) as a key weakness in destination governance, should not be read merely as a technical policy gap. Rather, it reflects a deeper governance imbalance in which socio-cultural knowledge is acknowledged rhetorically but insufficiently embedded institutionally. This interpretation reinforces the importance of more inclusive and nature-based adaptation strategies (Alexandrakis et al., 2019; Day et al., 2020) and stronger bottom-up management systems (Lafrenz Samuels & Platts, 2022). It also extends Chief's (2015) argument by showing that community participation is not simply desirable as a normative principle; it is a practical condition for making climate policy more context-sensitive, socially legitimate, and operationally effective. Conversely, when top-down decision-making overlooks cultural relations, climate governance risks reproducing the very exclusions that undermine sustainability, community empowerment, and climate justice (Sesana et al., 2020; Daly et al., 2022; Rastegar & Ruhanen, 2023).

The findings further suggest that traditional knowledge should not be treated as a nostalgic or symbolic heritage asset, but as an applied governance resource whose effectiveness depends on how it is combined with modern scientific knowledge. Participants did not portray traditional practices as self-sufficient solutions; rather, they emphasized that such practices become most valuable when translated into contemporary planning, restoration, and adaptation frameworks. This deepens existing literature on the integration of traditional wisdom with modern science (Makondo & Thomas, 2018; ICOMOS, 2019; Lauter, 2023) by showing that, in heritage tourism settings, multi-knowledge approaches are not only epistemically valuable but operationally necessary. In this respect, the study supports calls for more innovative climate information and

techniques (Vincent et al., 2022) and for a "co-productive path forward for local knowledge mobilization" (Klenk et al., 2017, p. 1). It also reinforces Chief's (2015, p. 8) argument that climate responses are strengthened when they are "rooted in multiple ways of knowing and evaluating," thereby broadening the range of methods available to policymakers and practitioners (Lemi, 2019). Importantly, the findings also indicate that this integration can generate tourism value alongside adaptive value. As the Yazd example suggests, the neglect of historically embedded water and architectural knowledge can heighten vulnerability, whereas the incorporation of such knowledge can strengthen both resilience and destination distinctiveness. In this sense, employing multiple knowledge systems in heritage tourism does more than diversify practical responses to environmental change; it can also enhance destination attractiveness through culturally meaningful products, narratives, and visitor experiences, as suggested by Esfehani and Albrecht (2019).

A further contribution of the findings is that they position awareness not merely as an outcome of policy, but as a mechanism through which climate capacity is built in heritage tourism settings. The data suggest that when traditional knowledge is made visible through tourism interpretation, community engagement, and policy learning, it helps stakeholders understand climate change not only as an environmental problem, but as a socio-cultural challenge requiring locally grounded responses. Awareness, therefore, is productive rather than passive: it fosters context-specific understanding, preparedness, practical skills, and recognition of communities as legitimate knowledge holders in climate governance. This interpretation is consistent with research showing that multidimensional awareness, delivered through formal and informal educational processes, is central to reducing disaster risk (Shaw et al., 2009), strengthening resilience (Kumar et al., 2021), and supporting adaptive programs (Loehr & Becken, 2021). In the present study, awareness also appears to work as an institutional bridge between knowledge systems, helping tourism actors, officials, and communities move from symbolic appreciation of traditional practices toward their practical incorporation into climate action. This means that climate capacity building in heritage tourism should not be understood only in technical or managerial terms, but also as a socio-cultural learning process through which more plural and inclusive forms of governance become possible.

All together, these findings show that traditional knowledge matters in heritage tourism climate governance not only because it contains adaptive practices, but because it reconfigures who can

participate in knowledge production, how resilience is understood, and what counts as legitimate climate action in World Heritage Sites.

5.1 Theoretical contributions

Applying the environmental sociology theoretical framework, this study contributes to the evolution of the theory in three ways. Firstly, the theory has predominantly been applied to discuss cultural dimensions in domains such as environmental science (Gould & Lewis, 2009) or tourism (Kousis, 2000; Zhang, Higham, and Albrecht, 2020). However, this study demonstrates the adaptability of environmental sociology in addressing the dynamics of increasing climate threats and impacts in tourism, particularly heritage tourism settings. It explains the pathways through which social relations can be systematically integrated into strategic planning for climate resilience, thereby fostering a more inclusive and effective governance framework for heritage tourism sites. Specifically, this research provides a nuanced understanding of how local communities interact with and adapt to environmental changes, offering critical insights for sustainable development in vulnerable heritage contexts (Adekuajo et al., 2023).

Secondly, the study demonstrates how locally embedded epistemologies can challenge dominant technocratic approaches and contribute to more socially informed climate responses, calling for policy frameworks that embrace multiple knowledge systems (Klenk et al., 2017). It further highlights how epistemological pluralism can support more inclusive and contextually grounded climate governance. This aligns with environmental sociology's core argument that effective climate action depends not only on technical solutions but also on socially constructed meanings, collective learning, and participatory engagement within local contexts. It also aligns with global policy debates such as UNESCO's LINKS Programme (2025) and the World Heritage Centre's Climate Action Policy Document (2023), which stress that community-based knowledge should serve as a core component of climate governance rather than a supplementary input. Building on this global direction, the theoretical contribution of this study lies in offering a more deepen understanding of one particular form of community-based wisdom, and its practicality in tourism climate change setting. This is particularly relevant given that the practical integration of climate

change knowledge into tourism practices has been limited, despite widespread awareness of its impacts (Hübner & Ioannides, 2025).

Finally, by providing real-world examples and cases, this study provides empirical support for ongoing calls for a more comprehensive approach to climate governance, one that values and facilitate bottom-up governance models in supporting environmental sociology's emphasis on participatory management (Gould & Lewis, 2009), and climate justice principles (Smith & Sharp, 2012). It highlights the potential of traditional knowledge not only as an adaptation mechanism within tourism, but also as a source of symbolic and place-based meaning that strengthens the distinctiveness of destinations in the tourism market.

This study extends Tribe & Liburd's (2016) discussion from merely focusing on tourism to the climate discourse in tourism. It challenges the predominance of singular, science-led approaches and instead advocates for a more epistemologically plural understanding of knowledge systems in this field. Recognizing diverse epistemologies not only enriches the analytical foundations of tourism–climate research and action but also strengthens the capacity of communities to articulate their perspectives and 'speak back' (Dei, 2008) to the conventional pathways of production and practicing tourism initiatives dealing with climate change that may legitimize marginalization and inequality.

5.2 Practical implications

The practical implications of this study extend across policy, site management, tourism product development, and stakeholder capacity building. The findings suggest that the main practical challenge is not the absence of traditional knowledge itself, but the lack of operational mechanisms to translate that knowledge into day-to-day climate governance in World Heritage Sites. For tourism managers and policymakers, this means that recognizing traditional knowledge at a rhetorical level is insufficient; it must be embedded in implementable procedures, planning tools, and participatory decision-making structures. This implication is especially important given the limited availability of climate action plans in tourism destinations and the continuing lack of clear operational guidance in heritage tourism settings (Scott, 2021; UNESCO, 2023).

First, public authorities and site-management bodies should develop site-specific climate adaptation protocols that explicitly identify where and how traditional knowledge can be used in

risk assessment, restoration, infrastructure maintenance, visitor management, and emergency preparedness. Rather than treating community knowledge as a general cultural input, heritage tourism governance should specify its operational role in issues such as water management, surface drainage, building materials, architectural orientation, shading, and heat mitigation. This would directly address the finding that participants perceived a clear policy vacuum regarding the practical use of traditional knowledge, despite substantial local expertise. In management terms, this implies moving from broad heritage protection statements toward formal planning instruments, checklists, and implementation guidelines that can be used by site managers, local municipalities, and tourism businesses. Such an approach would align with calls for more context-sensitive, community-based, and participatory governance in heritage and climate policy.

Second, heritage tourism managers should use traditional knowledge not only as an adaptation resource but also as a destination-development asset. The findings indicate that traditional knowledge can diversify the tourism product base by generating interpretive experiences, storytelling formats, and place-based attractions linked to local lifestyles, historical livelihoods, and environmental adaptation. This means that destination managers, guides, eco-lodge operators, and cultural entrepreneurs could incorporate traditional water systems, vernacular architecture, old cooling methods, local craftsmanship, and climate-related narratives into visitor experiences to strengthen both resilience and destination distinctiveness. Importantly, this implication should not be reduced to cultural display or commodification. Instead, it requires carefully designed interpretation strategies that connect heritage meaning with contemporary climate relevance. In this way, climate adaptation can become part of the visitor experience itself, turning traditional knowledge into a resource for both conservation and market differentiation, in line with wider calls for resilience-based tourism development (Mandić et al., 2025).

Third, the findings suggest that climate governance in heritage tourism should be institutionalized through co-management structures rather than occasional consultation. Local communities were not portrayed merely as beneficiaries of policy, but as knowledge holders whose practical experience can improve the quality, legitimacy, and feasibility of climate responses. Therefore, policymakers should establish regular participatory forums, local advisory panels, or community consultation mechanisms within heritage tourism governance to involve local actors in the design, implementation, and review of climate initiatives. At the operational level, this could include

requiring community representation in adaptation planning committees, integrating local expertise into restoration and infrastructure decisions, and developing protocols for documenting and evaluating traditional practices before climate interventions are implemented. This is particularly important in heritage tourism contexts where top-down governance can overlook context-specific solutions and weaken local legitimacy. A more participatory model would therefore support both better climate governance and fairer representation, consistent with environmental sociology's emphasis on participatory management and climate justice.

Fourth, practitioners should treat awareness and training as core components of climate management rather than secondary communication activities. The findings show that traditional knowledge can enhance climate capacity by making environmental change understandable through locally meaningful examples and historically grounded practices. This implies that heritage site managers, tourism authorities, and local education providers should invest in training workshops, interpretation programs, practitioner manuals, and cross-site knowledge-sharing platforms that help different stakeholder groups understand how traditional knowledge can be translated into climate action. Such initiatives should target not only local communities, but tourism businesses, guides, conservation staff, and municipal officials. In practical terms, this could include site-based demonstration projects, peer-learning exchanges between World Heritage Sites, and applied training on integrating traditional and scientific knowledge in restoration, risk reduction, and tourism operations. These measures would help transform awareness into applied adaptive capacity and would support more durable, culturally grounded climate action.

Taken together, these implications suggest that heritage tourism managers should move beyond viewing traditional knowledge as a symbolic cultural asset and instead treat it as a strategic resource for destination resilience, governance legitimacy, and tourism innovation. For practice, the message is clear: stronger climate governance in World Heritage tourism requires not only greater policy attention but also more operational detail, more participatory structures, and more deliberate connections between adaptation planning and tourism product development.

5.3 Limitations and directions for future research

We acknowledge that the empirical focus of the study centers on a limited number of locations, which may limit the transferability and impact of the research results. However, the in-depth analysis of the subject researched can be adjustable and transferable to other similar contexts that share comparable social and organizational characteristics. Further studies exploring this issue across different locations and cultural contexts would be valuable in providing a more comparative understanding of the practicalities and challenges of integrating traditional knowledge into heritage tourism and climate actions.

Therefore, we suggest that future research should prioritize exploring effective strategies for engaging with local communities, facilitating climate considerations knowledge exchange, encouraging cross-cultural dialogue, and developing policies that simultaneously tackle climate change and support the heritage asset and heritage tourism sector. Additionally, it would be beneficial to explore how such approaches could be scaled and adapted to different categories of World Heritage Sites, particularly those facing similar climate and tourism-related challenges.

While qualitative methodology provides in-depth insights and a nuanced understanding of the subject, we acknowledge that future research could benefit from quantitative or mixed-method approaches to complement these findings. We also recommend that future studies incorporate in-depth documents and policy analyses to broaden the contextual understanding of integrating traditional knowledge into tourism climate policy.

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