Journal of Sustainability Science and Management
Volume 20 Number 9, September 2025: 1908-1932
eISSN: 2672-7226
© UMT Press

RESILIENCY OF CULTURAL HERITAGE BUILDINGS: LESSONS LEARNED FROM OLD CITY OF GHADAMES

AHMED HAMED ALI HAMED*, AIMAN Al-ODAINI, JAMALUDIN NON AND NIZAMUDDIN INAMDAR

Faculty of Engineering and Built Environment, Lincoln University College, Wisma Lincoln, No. 12-18, Jalan SS 6/12, 47301 Petaling Jaya, Selangor, Malaysia.

**Corresponding author: hamed@lincoln.edu.my*
http://doi.org/10.46754/jssm.2025.09.010
Submitted: 2 January 2024 Revised: 28 January 2025 Accepted: 10 March 2025 Published: 15 September 2025

Abstract: This article explores the concept of resilience within the context of cultural heritage homes, examining how they adapt to and recover from various pressures of modernity and social change. Initially, resilience theory is discussed, laying a foundational understanding that expands beyond the individual to encompass family units and communities. The discussion the focuses on the risk factors that threaten the preservation of cultural heritage, including environmental threats and neglect. Through two main case studies, including the Old City of Ghadames, the article illustrates the multifaceted nature of resilience, particularly highlighting the crucial role of social use. By analysing how traditional forms of cultural heritage buildings are utilised for social functions such as communal gatherings and religious ceremonies, the study demonstrates their contribution to the resilience of these historic spaces. The Old City of Ghadames serves as a case study to showcase resilience through social use. The article concludes by reaffirming the importance of social interaction and community engagement in fostering the resilience of cultural heritage in an ever-evolving world.

Keywords: Cultural heritage, resilience, social use, conservation, Old City of Ghadames.

Introduction

The concept of built environment was initially proposed by social scientists Amos Rapoport (Rapoport, 1990). The term built environment refers to man-made environments that include buildings and infrastructure that enables human activity (e.g., physical, social, cultural, and natural) (Omer, 2017). Built environment has been applied to address: (a) The complexity of the urban fabric, which includes systems (e.g., socio-technical) that scales to buildings, cities, as well as regions, each with its own policymakers, constraints (e.g., time), and agendas and (b) environmental issues due to the man-made buildings and infrastructure. One of the main factors that pose a significant challenge to the built environment is the growth of the natural population, in which development increases across the globe, with more people living in urban areas (i.e., urbanisation). As an example, urbanisation is at 85% in Brazil (Ahmed *et al*., 2022) and 76% in Malaysia (Mat Lazim, 2020) in 2020.

This increase in urbanisation with the natural growth of population was enabled by the development of the world economy, which in turn resulted in significant environmental issues such as climate change (Gu, 2018), built environment issues such as high energy consumption in the construction industry, which is also considered to be one of the major sources of consumption of natural resources in Europe (Ahmed *et al*., 2022), and risks to cultural heritage. Past studies have focused on: (a) Developing successful sustainability strategies for energy consumption; (b) the relationship between built environment and unbuilt environment (e.g., social–ecological system), which resulted in the examination of built environment from the perspective of culture and nature (Hassler & Kohler, 2014); and (c) establishing resilience across the different domains of built environment (e.g., social-ecological systems, buildings, cultural heritage, and climate change), alongside factors such as urbanisation (or modernisation).

With the rise in urbanisation, urban planners, decision-makers, architectures, and organisations that has a significant role (or influence), the built environment focuses on accommodating policies to enhance and maintain sustainability and resilience (Sjostrom & Bakens, 1999; Bagheri & Hjorth, 2007; Lam *et al*., 2010). Sustainability and resilience are documented policies and frameworks that include a set of objectives that aim to enhancing the relationship between the built environment and its surroundings (i.e., social environments) (Lizarralde *et al*., 2015). These sustainability and resilience measures are guided towards the built environment, which consist of spaces (e.g., public spaces such as streets and private spaces such as buildings). In order to understand how, why, and when to practice resilience and sustainability measures, it is crucial that the relationship between space and user be understood. Physical spaces are spaces that accommodate (or shelters) user activities. Examples of public spaces are streets, in which users mainly use it for movement and gatherings as a social space (Mehta, 2013).

The space (or physical space) is the main actor that enables user behaviour (Vischer, 2008), as shown in Figure 1 while the social context shapes it. Built environment, viewed from the perspective of the user, forms the basis to the theory. Building users underpin built environment theory, as they are the ones who are sheltered and shaped by the built environment. Therefore, the built environment encompasses theories related to the physical environment—such as buildings—framed through sustainability and resilience, as well as user experience theories that view the built environment as supporting the activities of its occupants (Vischer, 2008). User experience provides in-depth knowledge of the relationship between the built environment and users' activities, in which it enables the study of person-space interactions. User experience is usually quantified and measured in terms of user satisfaction using experimental psychology responses (i.e., surveying user's satisfaction to the built space they occupy).

Both the built environment and its users play a vital role in enhancing attributes such as liveability, resilience, and sustainability, particularly in the context of increasing urbanisation. The relationship between the built environment and its users can be examined from various perspectives. For example, street spaces, as public domains, may be viewed solely as transit corridors by some while others consider them as social spaces used for more than movement. In this project, the focus is on the relationship between the built environment—specifically buildings—and users, examined through the lens of user activities and the spaces they occupy. This approach allows for a level of abstraction that can be applied across a wide range of built environment contexts.User interactions with public spaces in the literature are described in terms of place, behaviour settings, and environmental affordances.

The concept of behaviour setting refers to everyday human behaviour as framed by Barker's theory (Barker *et al*., 1968), which examines the relationship between physical spaces (i.e., settings) and the behaviours they elicit. Canter's place theory (1997) further advances this understanding by identifying three key dimensions of place: Its physical characteristics, the activities it supports, and the meanings it holds for individuals. While place theory does not prescribe the quality or condition of the setting, it introduces variables that enable the study of user experience in

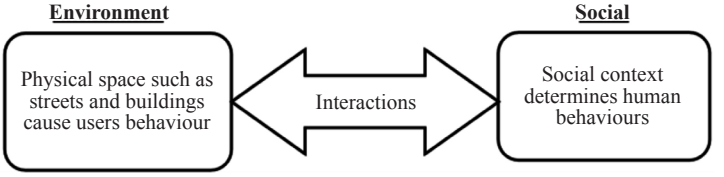

Figure 1: The relationship between physical space and user behaviour

relation to the socio-physical environment. In essence, this theory suggests that our understanding of settings emerges from the interplay between what we do and feel in those physical environments. Building on Barker's work, Gibson (1997) introduced the theory of environmental affordances, which posits that physical settings not only enable behaviour but also support aesthetic experience.

Resilience Theory

The built environment includes human-made structures and infrastructure that constitute social and cultural capital. Urbanism includes complex systems that have socio-technical characteristics with different scales, regions, and cities. The built environment also refers to the relationship between built and unbuilt parts of the environment that corresponds to culture and nature; hence, its relevance within the social-ecological system framework. Resiliency provides opportunities to explore the changes in conditions of planning and designing methodologies (or approaches). According to Hassler and Kohler (2014), there is a need to distinguish between self-organising and designed systems at different levels of scale, everal definitions of resiliency in a built environment have emerged:

- The capacity of systems to absorb shocks while maintaining functionality, structure, and identity.
- A model encompassing multidisciplinary definitions and controlled intermodal relations.
- Varied types of resilience from multiple sectoral models, which may be loosely connected (i.e., as a metaphor).

Resiliency from a theoretical perspective has been addressed in several fields such as social science, education, and psychology. Van Breda (2001) stated that resilience theory addresses the strengths that people and systems demonstrate that enable them to rise above adversity. Resiliency primarily revolves around two components: (a) Protective factors such as institutional, family, personal, and social factors and (b) life challenges that may threaten individuals such as psychosocial and societal (i.e., an individual's relationship to society) challenges. Alvord and Grados (2005) posited that resilience required an identified risk, crisis, or challenge, followed by a specified positive outcome. However, debates persist regarding what establishes resilience and how to measure successful coping mechanisms.

Resilience is a multi-dimensional attribute that can characterise individuals, families, and communities. Research suggets that a resilient individual must exhibit positive outcomes in different aspects of life (Zolkoski *et al*., 2012) and that resilience is acquiring considerable skills in various fields that enable an individual to cope (Alvord & Grados, 2005).

Resiliency originated from the field of medicine. However, it is primarily explored in the behavioural sciences. Research in this area have focused on preventing the development of psychopathology (i.e., psychological disorders such as autism and depression) from a life course perspective, identifying the processes and systems involved in regulating protective factors (i.e., factors such as the family that is associated with resiliency), and promoting resilience in children through prevention, intervention, and policy (Zolkoski *et al*., 2012).

In the literature, resiliency is discussed in terms of individual resiliency, family resiliency, and community resiliency. It is further categorised into several forms: (a) Anticipation, in which the resilience approach is obtained by providing anticipation (or avoiding) measures; (b) absorption, in which the resilience approach is obtained by providing absorption that enable objects to absorb (or withstand) risks; (c) reconfiguration, in which resilience approaches aim at reconfiguring the object to cope (or adapt) to risks (or changes); and (d) restoration, in which, resilience approaches aim at enabling objects or environment to overcome (or recover) from risk (or change).

Individual Resiliency

Kaplan *et al.* (1996) defined individual resiliency as an individual's capacity to face challenges in times of stress. Saleebey (1997) stated that resiliency is the skills and knowledge gained from facing challenges. Individual resilience can be categorised into several patterns (Polk, 1997). The first is the dispositional pattern, which refers to physiological and psychological traits—such as ego strength and physical health—that promote resilience. Dispositional resilience specifically involves an individual's sense of control over daily life, personal commitment, and attitude when facing challenges (Sagone & De Caroli, 2014). The second is the relational pattern, which refer to an individual's relationships with others and their role in society. The extent of the relational patterns is not limited to close and direct connections; it can span to a broader societal system. The third is the situational pattern, which are aspects that represent the linkage between an individual and the encountered challenges (e.g., problem-solving abilities, response ability to challenges, and the individual's capacity to take actions). And finally, the philosophical pattern, which is an individual's view (e.g., view of the current situation of surroundings and life view) that exhibit resiliency. This may include an individual's statement of positivity found in life experiences (Van Breda, 2001).

The resiliency of individuals has also been defined in terms of coping, in which an individual's capacity to manage life challenges is significant to their resilience. Pearlin and Schooler (1978) stated that coping is actions taken by individuals to avoid harmful challenges. The definition was derived from interviews with 2,300 participants in an urban area (i.e., Chicago). The authors identified three main coping strategies, each associated with different outcomes:

- Response with a positive outcome: The individual response produces a situation opposite to the harmful challenge (i.e., the individual successfully overcomes the hazardous challenge). This coping method was the least used, primarily due to: (a) Difficulty in recognising the situation (i.e., the harmful challenge) due to stress and (b) fear that addressing the situation directly may lead to more stress.
- Response with balanced control: The individual response by controlling the situation after it occurs and before the stress occurs (i.e., balancing the situation), which makes the individual less stressed by ignoring some of the situations. The individual reduces the importance of the situation in favour of the current life situation. This response was the most used method.
- Response with balanced stress: The individual focuses on controlling the stress after it occurs. This response does not focus on the response itself; instead, it focuses on the resulting stress by using stress management techniques and individual's cultural values (e.g., cultural values that provide a strategy to increase an individual's endurance).

From the literature, it is noted that individual approaches to resilience comes from internal aspects (e.g., initiative approaches) and external aspects (e.g., family). Therefore, individual resilience can be calculated as the ratio between protective factors and life challenges presented at any moment. Research on individual resiliency initially focused on children, who managed to cope with and overcome adverse childhood conditions. Earlier studies identified factors that explain how some children develop resilience and achieve positive health and well-being outcomes in adulthood. A notable study by Werner and Smith (2019) found that by adolescence (ages 16–18), 33% of children identified as at risk in early childhood (ages 2–5) had developed into competent and confident adults. Risk factors in this context include biological aspects such as congenital disabilities and low birth weight, as well as environmental challenges such as poverty and family conflict

(Zolkoski *et al*., 2012). Resilience in children is understood as the attainment of positive outcomes despite exposure to significant adversity. A core element of resilience research is the presence of risk and the protective factors that either contribute to favourable outcomes or mitigate the effects of adversity.

Family Resiliency

Family resilience provides a framework that challenges the idea that resilience is solely an individual trait, offering the family as a unit of analysis (Frankel, 1992). Although much of the literature conceptualises resilience at the individual level, individuals are embedded within family systems and more broadly, within communities. Consequently, family and community contexts have been discussed as factors that affect resiliency (e.g., contribute to resiliency). However, the relationship between individual, family, and community levels of resilience is not consistently defined in the literature. These levels may at times complement one another or appear as independent systems (Van Breda, 2001).

Family resilience is viewed as a system that contributes to the development and sustainability of individual resilience. McCubbin *et al*. (1982) examined the family as a support system, particularly in relation to stress and coping, highlighting its influence on individual resilience. Hawley and DeHaan (1996) identified two key components of family resilience: Risk factors and protective factors. Expanding on this, Walsh (2003) defines family resilience as the capacity of a family system to withstand and rebound from adversity while simultaneously fostering individual development and family cohesion. Walsh's model outlines three essential domains of family resilience: Family belief systems, organisational patterns, and communication/problem-solving processes. The evolution of heritage homes can present unique challenges and opportunities for family resilience. These dwellings are not merely structures but repositories of family history and identity. According to Pynoos *et al.* (2008), the intergenerational transmission of attachment to place plays a crucial role in how families maintain continuity in the face of change. As these homes undergo modernisation or are repurposed to adapt to current living standards, families must negotiate between preserving their heritage and embracing contemporary needs.

Hernández *et al.* (2007) examined how the process of adapting heritage homes for modern use can be a source of stress, but also a catalyst for family bonding and resilience. The family's ability to collectively negotiate the preservation of meaningful aspects of their home while integrating necessary modern features can be a testament to their resilience.

Risk and protective factors within the family, as highlighted by Hawley and DeHaan (1996), play a crucial role in this adaptation process. Protective factors such as strong family bonds, shared values about the importance of heritage, and effective communication can help families navigate the complexities of modernising their homes without losing their cultural significance. On the other hand, risk factors such as financial constraints, disagreement on the value of preservation, or lack of support from the extended family or community can undermine the family's resilience and threaten the integrity of the cultural heritage. In their study, Fullilove and Saul (2006) suggest that the sense of displacement and loss can be profound if families are forced to modernise or leave their heritage homes. Therefore, policies and interventions that support families in maintaining their cultural legacies in heritage homes can bolster not only family resilience, but also contribute to the preservation of cultural history.

Community Resiliency

The transition from individual to family to community resilience has historically involved blurred boundaries, though research has clarified many of these aspects (McKnight, 1997; Blankenship, 1998; Bowen, 1998; Bowen & Martin, 1998). However, debates persist concerning the relationship between family resilience and community resilience.

Traditionally, the community was often viewed as a risk factor that challenged family resilience. Structural issues such as political instability, economic hardship, crime, limited resources, and poverty were frequently cited as negative influences on families. However, recent studies and refinements in resilience theory have reframed the community as a crucial context for protective factors. These include community support systems and religious organisations, which have been widely acknowledged as external resources that enhance family resilience.

Community support (or social support) has been considered one of the main sources of protective factors. Papadaki and Kalogeraki (2017) highlight social support as a significant mechanism in coping with crises, particularly those socio-economic implications. Their research on family stress is guided by three central questions: What constitutes social support? What type of social networks offer support to individuals and families? And what family stressors elicit social support?

Community resilience is often characterised as the sustained ability of communities to withstand, adapt to, and recover from adversity (Norris *et al*., 2008). In the context of cultural heritage, community resilience becomes essential as it encompasses not only the physical upkeep of heritage homes, but also the preservation of collective memories, practices, and identity that these structures symbolise. The importance of community resilience in preserving cultural heritage is multifaceted. Communities serve as stewards of cultural heritage, maintaining traditional knowledge and practices that contribute to the care and restoration of heritage homes. Moreover, resilient communities foster social cohesion and collective efficacy, which are crucial when facing threats to cultural heritage such as natural disasters, urbanisation, or economic pressures.

Community-level strategies contributing to the resilience of cultural heritage homes include:

- Local governance and policies: MacLean *et al*. (2014) emphasise the role of local governance in empowering communities to preserve their heritage. Policies that encourage local decision-making and provide resources for heritage conservation can enhance community resilience.
- Community engagement and participation: Active community involvement in the preservation of heritage homes can foster a sense of ownership and responsibility. Tidball and Stedman (2013) discuss the concept of "civic ecology", where community stewardship of the local environment, including heritage structures, enhances resilience.
- Economic development strategies: Heritage homes can be incorporated into the local economy through tourism, crafts, and other culturally relevant industries, contributing to economic resilience. Zhang and Zhao (2009) explore how cultural heritage can be leveraged for community economic development while ensuring its preservation.
- Education and capacity building: Informing and educating community members about the value of their cultural heritage and providing skills for its upkeep can build capacity for resilience. Chigbu (2015) argues for community-based educational programmes that align with local cultural contexts.
- Social support networks: The presence of strong social networks can be vital in mobilising community resources for the preservation of heritage homes. Papadaki and Kalogeraki (2017) highlight the role of social support in helping communities cope with crises that could impact their cultural heritage.
- Cultural festivals and events: Organising cultural festivals and events can revitalise traditional practices and reinforce community identity.

While communities can present challenges to family resilience, they are also a foundational source of support and resources. Efforts to bolster community resilience are intrinsically linked

to the preservation of cultural heritage homes, requiring concerted strategies that engage local governance, social support networks, and economic and educational initiatives.

Risk Factors

Environmental Threats

Environmental threats pose significant challenges to the integrity and longevity of cultural heritage homes. The impact of such threats can be multifaceted, affecting not just the physical structure, but also the cultural practices associated with these homes. Firstly, the effects of climate change are increasingly evident in the form of more severe weather events. Heritage homes, many of which were built before the advent of modern building standards, are often not equipped to withstand these changes. For example, increased rainfall and flooding can lead to water damage while higher temperatures and humidity can accelerate the decay of building materials (Sesana *et al*., 2021). Secondly, earthquakes present a significant risk to heritage homes, especially those constructed with traditional methods that may not include modern seismic reinforcements. Similarly, hurricanes and cyclones can cause structural damage to roofs, windows, and walls, in some cases, lead to the collapse of entire buildings (Jigyasu, 2002).

Thirdly, the materials used in heritage homes such as timber, brick, and mortar are particularly vulnerable to environmental factors. For instance, fluctuations in temperature and humidity can cause materials to expand and contract, leading to cracks and structural weakness. Salt crystallisation from rising damp is another issue that can erode masonry and decorative elements. Fourthly, biological growth such as mould, fungi, and insect infestation can be exacerbated by environmental changes. Increased moisture from heavy rains or floods provides ideal conditions for these biological agents to thrive, potentially compromising the structural integrity of wood and other organic materials (Caneva *et al*., 1991). Finally, cultural heritage homes located near coastlines are threatened by erosion and sea-level rise. Saltwater intrusion not only damages the foundations and landscaping, but can also lead to the salinisation of fresh groundwater sources used for the upkeep of these homes (Stanley & Warne, 1993).

While preventive measures such as reinforcing structures and using water-resistant materials can mitigate some of these risks, such interventions must be carefully managed to maintain the authenticity and historical value of the heritage homes. Moreover, in many cases, the financial and technical resources required for such interventions are insufficient, especially in less affluent regions. Environmental threats to cultural heritage homes are a growing concern that requires a coordinated approach combining modern conservation techniques with respect for historical authenticity and context. The resilience of these structures in the face of environmental changes hinges on proactive measures and the ability to adapt traditional conservation practices to meet contemporary challenges.

Neglect and Decay

Neglect and decay represent a pervasive threat to the resilience of cultural heritage homes, often resulting from a complex blend of socio-economic, political, and environmental factors. Economic difficulties can starve these historic structures of necessary maintenance funds, leading to a gradual deterioration. Political unrest or rapid social changes may divert attention from preservation, causing these homes to be abandoned or inappropriately repurposed. Additionally, as populations shift toward urban centres, rural heritage homes are left unattended, succumbing to the relentless progression of natural decay. The degradation of building materials is an inexorable consequence of neglect. Wood rots, bricks crumble, and stones erode when regular maintenance is forsaken. The natural processes of weathering due to rain, wind, and temperature fluctuations accelerate this decay, compromising the homes'

structural integrity. Moreover, biological growth such as vegetation and pests can quietly inflict damage; roots can destabilise foundations and termites can hollow out wooden beams.

The ramifications of such neglect are profound, in which the architectural integrity of heritage homes erodes, their ability to convey historical and cultural narratives wanes, and the structures can become hazards, leading to restricted access. Yet, this gradual descent into disrepair is not unavoidable. Proactive, routine maintenance is crucial for these homes' longevity. Engaging the community in their upkeep can foster a sense of shared stewardship, while adaptive reuse can ensure these structures remain lived-in and cared for, respecting their cultural significance while imbuing them with new purpose. Preservation in this sense is not merely about halting the march of time, but facilitating a respectful coexistence with it, ensuring that heritage homes remain safe, significant, and integral to the cultural fabric they embody. Table 1 summarises the risks associated with neglect and decay.

Table 1: Challenges and strategies for preserving cultural heritage homes

Category	Description
	Root Causes of Neglect
Economic Hardship	In areas facing economic decline, funding for maintenance of cultural heritage homes is often not a priority. Owners may lack the resources for upkeep, leading to a gradual deterioration (Stipe, 2003)
Socio-political Issues	Conflict, political instability, and rapid socio-economic changes can shift focus away from heritage preservation. Heritage homes may be abandoned or repurposed without consideration for conservation (Ashworth & Tunbridge, 2000; Bleibleh & Awad, 2020)
Urbanisation	The migration of populations to urban centers can lead to the abandonment of rural heritage homes, leaving them vulnerable to decay (Atamtürk, 2022)
	Processes of Decay
Material Degradation	Building materials like wood, brick, and stone are subject to degradation. Without regular maintenance, they can suffer from rot, erosion, and structural failure (Vijay, 2019)
Weathering	Environmental factors such as rain, wind, and temperature fluctuations cause weathering. Heritage homes without proper maintenance will suffer from accelerated decay due to these natural processes (Blavier *et al*., 2023)
Biological Growth	Unchecked, vegetation can grow on and around buildings, and roots can undermine foundations. Similarly, infestations by pests like termites can go unnoticed until substantial damage is done (Caneva *et al*., 1991)
	Consequences of Neglect
Loss of Integrity	The gradual loss of original materials and details erodes the architectural integrity of heritage homes, often beyond repair (DeSilvey, 2017)
Loss of Cultural Value	As a heritage home decays, its ability to convey historical and cultural value diminishes, leading to a loss of identity for the community (Smith, 2006)
Safety Hazards	Neglected buildings can become safety hazards, leading to restricted access, and further disconnection from cultural practices (Lavell & Maskrey, 2014)
	Strategies for Prevention and Mitigation
Regular Maintenance	Establishing routine inspections and maintenance can prevent minor issues from becoming major problems
Community Engagement	Involving the community in the upkeep and utilisation of heritage homes can keep them vibrant and reduce neglect
Adaptive Reuse	Finding new uses for heritage homes that respect their cultural value can ensure they remain occupied and maintained

Resiliency and Cultural Heritage

The concept of resiliency in the context of cultural heritage encompasses the ability of heritage sites and the communities associated with them, to withstand, adapt, and recover from various challenges and changes while maintaining their cultural, historical, and architectural integrity. This section explores the relationship between resiliency and cultural heritage, underlining the importance of resilient practices in preserving heritage sites, and provides case studies to illustrate these points.

In line with recent critiques of the perceived role of cultural heritage in resilience, Chapagain (2023) raises critical questions about the uncritical acceptance of heritage as inherently resilient. While many view heritage as a passive recipient of post-disaster recovery efforts, Chapagain suggests that heritage should instead be understood as a dynamic and evolving process, where resilience is not solely derived from its preservation but also from its ability to adapt to changing circumstances.

His work challenges the romanticised view of heritage resilience, advocating for a more nuanced approach that considers both the potential and limitations of heritage in resilience-building, particularly in post-disaster contexts. This perspective is crucial for understanding that cultural heritage does not automatically guarantee resilience and shows the importance of community engagement in heritage preservation and adaptation (Chapagain, 2023).

Theoretical Frameworks

The relationship between resiliency and cultural heritage is complex and multifaceted, deeply embedded in the continuous interplay of preservation, adaptation, and transformation. Holtorf and Kristensen's (2023) view that "cultural heritage is the continuous manifestation of change over time not its victim" offers a valuable framework for understanding this relationship. This view aligns with the idea that cultural heritage, much like natural heritage is not static but rather a dynamic record of ongoing changes and transformations. Cultural heritage's capacity to absorb disturbances, whether from natural disasters, societal shifts, or intentional destruction is a critical aspect of its resilience.

The destruction of the Bamiyan Buddha statues by the Taliban, as discussed by Holtorf and Kristensen (2023), exemplifies this. The subsequent response, focusing on the potential for the site to foster regional development and narrate its complex history, rather than simply attempting to restore it to its previous state, demonstrates a resilient approach. This perspective challenges the notion of loss in heritage as a purely negative outcome, suggesting instead that transformation and adaptation are natural and necessary components of a living culture.

Ingold's (2021) view of cultural heritage as a process continually undergoing rebirth and transformation, with no definitive beginning or end, offers another dimension to understanding resilience. This approach sees buildings and people not as static entities, but as ongoing processes, continuously shaped and reshaped by their interactions with the environment and society. It posits that even in their physical absence or altered state, heritage structures continue to influence and interact with the world around them.

For instance, the response of the native Hawai'ian community to the eruptions of Mount Kilauea illustrates how cultural resilience can manifest. The community's acceptance and reverence for the natural process, despite significant losses, reflect a deep-seated resilience rooted in their cultural heritage. This attitude exemplifies how heritage can inspire contemporary communities to embrace change and adapt successfully to new challenges.

The Sendai Framework for Disaster Risk Reduction 2015–2030 acknowledges the role of migrants in enhancing community resilience (Center, 2015). This aligns with Holtorf's argument that resilience is linked to the capacity to absorb disturbance and adapt to

change. Migrants, through their experiences of dislocation and adaptation, often demonstrate an enhanced ability to embrace new forms of cultural heritage and contribute to the hybridisation of traditions. In addition to the perspectives offered by Holtorf and others, another valuable theoretical framework for understanding the resilience of cultural heritage is derived from the concept of "social resilience". This approach, which focuses on the social dimensions of heritage sites and the communities that interact with them offers a comprehensive understanding of how cultural heritage adapts and survives in the face of changing environments and societal needs.

The resilience of cultural heritage is closely tied to the communities that surround and interact with these sites. Adger (2000) emphasises the importance of social capital and community networks in resilience, suggesting that engaged communities are better equipped to protect and adapt their heritage in response to external pressures. This approach values the active participation of local communities in decision-making processes and recognises their role in sustaining the cultural significance of heritage sites.

Another key aspect of social resilience in cultural heritage is the concept of adaptive reuse. As discussed by Plevoets and Van Cleempoel (2011), adaptive reuse involves repurposing heritage structures for new uses while respecting their historical and cultural values. This approach not only preserves the physical structure, but also ensures that these buildings remain relevant and functional within contemporary society, thereby sustaining their cultural significance. An exemplar of adaptive reuse and social resilience is the transformation of the High Line in New York City. Once an abandoned railway line, it has been repurposed into an urban park. This project, driven by community advocacy and innovative design, not only preserved a piece of New York's industrial history, but also created a dynamic public space that caters to the social and ecological needs of the city's residents (Heritage, 2020).

The United Nations Educational, Scientific and Cultural Organisation's (UNESCO) emphasis on intangible cultural heritage acknowledges the importance of practices, traditions, and knowledge systems in the resilience of cultural heritage (Heritage, 2020). The resilience of a culture is often reflected in how its intangible aspects such as rituals, languages, and crafts, adapt to modernisation and globalisation while retaining their core values and significance. The concept of cultural memory (Assmann & Czaplicka, 1995) plays a vital role in the resilience of cultural heritage. Cultural memory transcends the physicality of heritage sites and artifacts; it encompasses the shared memories, narratives, and histories that contribute to a community's identity. This aspect of resilience underscores the importance of storytelling, commemoration, and educational programmes in keeping the spirit of heritage alive.

The social resilience framework for cultural heritage places a strong emphasis on community engagement, adaptive reuse, and the preservation of intangible heritage. It underlines the idea that resilience is not just about withstanding adversities, but also about the capacity of heritage sites and their associated communities to adapt and thrive in a changing world. This perspective encourages a holistic approach that integrates the preservation of physical structures with the maintenance of social, cultural, and historical continuities.

Case Studies

Old City of Gourna, Egypt: Abandonment and Its Causes

The story of New Gourna, located on the West Bank of Luxor in Egypt provides a critical counterpoint to conventional narratives that view cultural heritage as an inherent source of resilience. Resilience in the context of heritage conservation is often defined by the ability of cultural practices and environments to adapt to contemporary challenges. However, New Gourna presents a case where well-intentioned preservation efforts were overshadowed by

social, cultural, and economic challenges that ultimately undermined the very resilience they aimed to foster. This case challenges the assumption that cultural heritage can automatically contribute to resilience when it is removed from its original social and cultural context.

The creation of New Gourna was driven by the Egyptian government's desire to protect the ancient Theban Necropolis, a UNESCO World Heritage Site of immense archaeological and historical significance. The local population of Old Gourna, which was located within the boundaries of this fragile site was engaging in activities that were causing damage to the tombs such as unauthorised excavations and looting. To safeguard these precious cultural assets, the government initiated the relocation of Old Gourna's residents to a new village, which would be designed to respect both the local architectural heritage and modern needs.

Commissioned to design the new village, the renowned Egyptian architect Hassan Fathy aimed to create a model community that would integrate traditional architectural techniques with sustainable living practices. Drawing inspiration from Nubian and Pharaonic architectural styles, Fathy designed a village that was intended to embody the cultural identity of the community while fostering self-sufficiency and environmental sustainability. However, despite the project's lofty ambitions, it became a significant example of how cultural heritage does not always translate into community resilience when the needs and identities of the people are overlooked.

Shortcomings of the New Gourna Project

Despite the good intentions, the New Gourna project encountered significant challenges and it failed to create a resilient community. The project can be critiqued in several ways.

Firstly, the challenge of imposed relocation and lack of community participation. One of the most significant flaws of the New Gourna project was the top-down nature of the relocation. The government implemented the move without consulting the local community, leaving the residents with little control over the process. The lack of participation in the planning and design stages led to a deep sense of disconnection from the new village. The residents did not feel a sense of ownership over the village, nor did they see it as an extension of their heritage.

This disempowerment of the community directly undermined the potential for social resilience in the new village. For example, as shown in Figure 2, the design centred around the courtyards being the essential part of the house. However, the concept of courtyards was foreign in Egypt and were rarely used. This created a disconnection between the design and the lives of the residents. Therefore, the forced relocation and the disconnection severed the

Figure 2: The inner courtyard of a house in New Gourna
Source: Fathy (2000)

residents' ties to their original community and heritage, a critical element of social resilience. The absence of community engagement in the design and planning of the village meant that the architectural solutions offered by Fathy did not align with the lived experiences or cultural interpretations of the villagers.

Secondly, although the relocation aimed to mitigate the negative impacts on the Theban Necropolis, it failed to address the underlying socio-economic challenges faced by the residents of Old Gourna. The community had traditionally derived its income from the antiquities trade, including the sale of artifacts from the tombs. However, New Gourna did not provide alternative economic opportunities for the residents to support their livelihoods. This lack of economic development in the new village led to resentment and further alienation from the project. Therefore, despite the promise of a better living environment, the lack of economic opportunities in New Gourna was a major factor in the community's dissatisfaction. The village failed to offer the same economic benefits that the residents had previously derived from their traditional ways of life, leading to economic disempowerment, a critical factor undermining resilience.

Thirdly, the challenge of design flaws and contested authenticity. Fathy's design was intended to honour the local culture by using traditional building materials and techniques. However, his approach to authenticity was rooted in a Western notion of welfare and modernity, which did not necessarily align with the community's cultural values. For example, the dome (Figure 3), a key feature in Fathy's design was associated by the residents with tombs and death, making the design uncomfortable for them. Similarly, the design underwent extensive alterations, including division of buildings to smaller units and extension of other units. Figure 4 shows an example of an alteration made to a window of one of the earthen buildings in New Gourna village. This illustrates how architectural elements that are considered culturally appropriate in one context may be perceived very differently in another, especially when the community's cultural interpretations are not taken into account.

Fourthly, the market and public spaces. A central part of Fathy's design was the creation of public spaces, including a market that was intended to serve as a gathering place for the community. However, these spaces were underutilised, and some public buildings were never completed. The failure of the market to serve as a community hub highlights the disconnection between the architectural design and the practical and social needs of the community. Public spaces that are not attuned to the social and cultural needs of the people are unlikely to foster community resilience. Therefore, the lack of practical value of these

Figure 3: The dome and residents' design modifications
Source: Ahmed & El-Gizawy (2010)

Figure 4: An alteration made by residents to a window in a building in New Gourna village
Source: Ahmed & El-Gizawy (2010)

spaces in daily life, combined with the absence of community input in their design, prevented them from becoming sites of social resilience.

Lastly, environmental and structural challenges. The deterioration of New Gourna's buildings, attributed to the rising water table and poor drainage systems, shows the need for solutions that are not only culturally sensitive but also environmentally sustainable. While Fathy's design was progressive in many ways, it failed to account for local environmental factors that were crucial for the long-term viability of the village.

In response to the deterioration of New Gourna, UNESCO initiated a project in 2009 to safeguard the site. This initiative aimed to preserve the original design of the village and promote Fathy's ideas about sustainable architecture and reinforce their relevance to contemporary concerns. The project involved restoration efforts, community engagement, and the establishment of an international centre for sustainable architecture dedicated to Fathy. This intervention recognises the value of the site and the need for a more community-focused approach, acknowledging that true resilience involves not just preserving structures, but also fostering a sense of belonging and cultural identity among the local population. The new system included a new drainage system to control the ground water levels, which was one of the main causes of the deterioration of the buildings.

The case of New Gourna demonstrates that cultural heritage is not inherently beneficial for resilience. It can also be a site of conflict, especially when preservation efforts do not involve the local community. The New Gourna project, despite its good intentions, highlights the risks of imposing preservation efforts that do not adequately consider the community's needs and interpretations of heritage, as well as how resilience can be seen as a community's resistance to unwanted change. Genuine resilience requires the active participation and empowerment of local communities, a sensitivity to the way they experience and understand the meaning of their heritage. The case of New Gourna teaches that cultural heritage preservation efforts must consider the social, economic, and cultural context of a community, these factors are as critical to success as the quality of the design and construction of buildings.

Old City of Ghadames, Libya: Modernisation and Abandonment

The Old City of Ghadames in Libya, often called the "Pearl of the Desert", provides a striking example of how modernisation can lead to the abandonment of a historic urban area. Unlike the Old City of Gourna, where the relocation was government-mandated for archaeological preservation, Ghadames' depopulation was more directly driven by the forces of modernisation and the shift toward urban development. Ghadames, with its distinctive desert architecture designed for thermal comfort, serves as an example of how heritage can contribute to resilience. However, it is also a place where the limitations and potential drawbacks of relying solely on heritage for resilience can be observed.

Modernisation and New Development

The modernisation of Libya throughout the 20th century, particularly the establishment of new urban areas, provided access to improved living conditions, modern housing, and infrastructure. The New City of Ghadames was developed with contemporary facilities, which attracted residents away from the Old City, drawn by the promise of better housing, access to modern utilities, and improved services. The shift from the traditional mud-brick homes of the Old City to the more modernised homes in the New City was not just about physical infrastructure, but also about changing lifestyle preferences. As shown in Figure 5, modern houses with garages for cars contrast sharply with the compact and traditional urban fabric of the Old City (Figure 6). While the residents' migration to the New City was largely driven by the search for modern conveniences, it also reveals the limitations of traditional urban forms in adapting to new economic and social realities. The Old City of Ghadames, with its ancient mud-brick homes, though well-adapted to the desert environment, lacked modern amenities such as air conditioning and indoor plumbing, which became increasingly desirable as living standards rose.

The shift from the old city to the new was driven by changing lifestyle preferences and needs. The traditional mud-brick homes and the unique architectural style of the Old City while culturally significant and well-adapted to the desert environment, lacked certain modern comforts and conveniences that became increasingly desirable. Economic changes also played a role, as opportunities and services in the new urban areas were more aligned with the evolving economy, drawing residents away from the traditional trade and lifestyle of the Old City.

Figure 5: Houses in the New City of Ghadames

Figure 6: Houses in the Old City of Ghadames

Despite its abandonment as a permanent living space, the Old City of Ghadames continues to be a site of significant cultural tourism. Its unique architecture, a UNESCO World Heritage site, attracts visitors from around the world, preserving its relevance and maintaining its cultural significance. The city's unique architecture, characterised by its covered streets and the integration of homes with communal spaces, remains well-preserved. This architectural preservation represents a form of resilience, maintaining the historical and cultural identity of the site.

The Old City is still used for certain cultural and religious events. Local festivals and traditions are often celebrated within this historic space, ensuring that the cultural connections to the area remain alive. The case of the Old City of Ghadames highlights the complexities of cultural heritage resilience in the face of modernisation. While the city has lost its role as a permanent residence due to the allure of modern amenities and economic shifts, it still retains significant cultural value through tourism, preservation of its unique architecture, and continued use for cultural events. This scenario underscores the multifaceted nature of resilience, where physical habitation is not the sole indicator of a site's cultural and historical significance.

Social Use and Its Impact on Resiliency in Cultural Heritage

The concept of social use plays a critical role in the resilience of cultural heritage, particularly in how the traditional elements of heritage buildings are utilised. This relationship can be understood through examining how social interactions and functions contribute to the enduring relevance and preservation of cultural heritage sites. Take the case study of the Old City of Ghadames. The city is distinguished by its unique architecture designed for desert living. Its buildings, constructed from mud-brick, lime, and palm wood are designed to keep temperatures cool in the scorching heat. Its covered streets create a network that connects the community in a way that is both practical and socially cohesive. The Old City of Ghadames offers a profound example of how social use contributes to the resilience of cultural heritage. Despite the modern challenges and the shift of permanent residents to the new city, Ghadames' Old City maintains its cultural significance and resilience, largely through its continued social use.

Enhancing Resilience through Social Use

The resilience of cultural heritage is often rooted in the continuation of traditional practices associated with these spaces. When

heritage buildings are used for traditional social functions—whether communal gatherings, religious ceremonies, or cultural festivals—they help maintain the site's relevance and significance within the community. This active use preserves cultural practices and fosters a deeper connection between the community and the heritage site. However, this resilience is not without its complexities, particularly when shifts in social dynamics and urbanisation impact the traditional functions of these spaces.

The meeting spaces in the streets shown in Figure 7 are a testament to the traditional social structures that were central to life in Old Ghadames. These spaces, located at key intersections or near significant buildings, acted as focal points for community gatherings, discussions, and decision-making. The streets were also meticulously planned to maintain a favourable microclimate, functioning alongside the buildings as a cohesive unit to ensure comfortable temperatures and humidity levels. In addition to reducing exposure to the sun, this design allowed for the preservation of privacy for family life while supporting a social life through interconnected homes, common walls, and "public footpaths" that extended to the roofscape, allowing women and children to socialise, trade, and move freely in line with Islamic traditions.

However, as modern pressures of urbanisation and the desire for contemporary living spaces mount, the traditional social use of these spaces faces challenges. The shift to new urban areas and the need for greater privacy and convenience may diminish the role these spaces once held in everyday life. While still used for cultural events and festivals, the current social dynamics in Ghadames are increasingly influenced by the modern world. This calls into question whether the continuity of social functions will be sustained or diluted as new generations experience traditional spaces with a more modern perspective.

City planning in Ghadames carefully balanced public and private spaces, a gradation that ranged from public to semi-public to semi-private to private. This hierarchy, embodied in the streets, alleys, and the gradation of house floors helped balance material and spiritual needs, age, and gender. These physical manifestations of communal culture still attract people for periodic gatherings and events. However, the ongoing resilience of Ghadames' Old City is as much about the preservation of its social functions as it is about the physical preservation of its structures. If these social functions wane in importance or are replaced by more modern lifestyles, can we still consider the city resilient in the same way?

Figure 7: Meeting space in the Old City of Ghadames

Figure 8: Covered streets in the Old City of Ghadames

Similarly, the covered streets depicted in Figure 8 illustrate a thoughtful adaptation to the local environment, providing shade and cooler temperatures in a harsh desert climate. These shaded paths offer respite from the sun, as well as privacy and security, serving as communal corridors, where the social life of the city unfolds. The covered streets promote social interaction and community cohesion, essential components of resilience. However, this communal spirit might be increasingly challenged as more residents move to newer urban developments that offer different lifestyles and amenities. The covered streets still facilitate social use, but their effectiveness in fostering community cohesion in the long term remains uncertain as modernisation advances.

The social interaction in the Old City of Ghadames is supported by various communal elements, as evidenced in the water distribution system, shown in Figure 9. This system served utilitarian purposes—providing water for drinking, cleaning, cooling, and agricultural irrigation, enabling it to play a significant role in social interaction. The water distribution channels were connected to a control system known as the water clock, which was manually operated by monitoring the water volumes and scheduling its distribution.

However, the operation of this system was more than just a mechanical process; it was an integral part of the community's social fabric. The inhabitants of the Old City used a flag system, sending a visible signal along the water stream to inform farmers that the water was about to stop, signalling the end of their turn and the beginning of another's. This system relied on cooperation and coordination among the residents, in its daily use, it reinforced a shared sense of responsibility for managing this critical resource.

While the water clock system was a remarkable engineering feat, it also raised important questions about the future of such traditional systems in a modernised context. The system required a level of collective action and community engagement, but as urbanisation progresses, will these traditional methods of resource management remain relevant? In the face of modern conveniences, will the communal aspects of this system, its role in fostering social cohesion, continue to thrive, or will they be replaced by more individualistic, technology-driven solutions? The flag system was more than a simple notification; it was a visual cue that highlighted the collective management of resources, reinforcing the sense of connection among the community members. However, the

displacement of these traditional practices due to modernisation may lead to a loss of these deeply rooted communal practices, raising concerns about the long-term resilience of such systems and their place in the evolving social landscape of Ghadames.

In Figure 10, we observe another critical element of the city's design that supported its social functions: The tinnaot (ventilation openings). These openings, strategically placed throughout the city, provided natural light and ventilation, making interior spaces more comfortable for both social and work activities. The tinnaot, along with the larger courtyard openings was integral in creating thermally comfortable environments, especially in the harsh desert climate. This design ensured that both communal and private spaces could be used throughout the year, regardless of the extreme temperatures outside.

While these architectural features are central to the city's resilience, it is important to recognise that their role goes beyond just physical comfort. They also contribute to social cohesion by facilitating interaction among residents. By creating comfortable spaces for social life, the tinnaot enabled people to come together, fostering the communal activities that are a cornerstone of resilience in Ghadames. However, with the migration of residents to the new city, these traditional elements may no longer serve their original social functions in the same way.

In light of modernisation, the role of the tinnaot and similar features raises an important question: As urbanisation and modern construction techniques become more dominant, will these traditional architectural solutions continue to support the same communal life? In the new city, where homes may not be designed with the same attention to local environmental conditions and social functions, the traditional resilience of the Old City might be diluted. As Ghadames evolves, the challenge will be whether the social resilience embedded in the architecture can be preserved or whether it will be displaced by new forms of living that prioritise privacy and individualism over communal interactions.

One of the major elements of social use that contributes to the resilience of the Old City of Ghadames is the Ain Al-Faras spring, also known as the "horse spring". The natural presence of this spring allowed the area to be settled by tribes and enabled the use of its water for both domestic and agricultural purposes, as seen in Figure 11. This spring has historically served as a cultural landmark, around which much of the city's social life revolved. Over generations, it has functioned as a space, where people share stories, news, and traditions, thereby reinforcing the community's bonds and identity.

Figure 9: The water distribution system in the Old City of Ghadames

Figure 10: Ventilation openings in the Old City of Ghadames

Figure 12 illustrates the continued use of Ain Al-Faras as a place of leisure and social interaction. Despite the migration of many residents to the New City, people continue to return to the spring to enjoy its waters and the tranquility it offers. The spring's ability to draw former residents back, providing a space for relaxation and socialisation, speaks to its deeply ingrained role in the community's collective memory and cultural practices. However, the long-term relevance of this cultural landmark is challenged by the migration of the younger generation, who are increasingly attracted to the modern amenities of the new city. This raises the question of whether traditional social spaces like Ain Al-Faras can maintain their cultural significance as modernisation progresses.

The social use of Ain Al-Faras demonstrates that resilience in cultural heritage is not merely about the preservation of buildings or artifacts; it is about maintaining the social and cultural practices that breathe life into these spaces. Ain Al-Faras continues to be a source of not just water but also joy and community for the people of Ghadames, making it a vibrant and essential component of the city's living heritage. Its ability to draw people back, particularly during the hot weather seasons, speaks to the enduring

Figure 11: Ain Al-Faras (horse spring) in the Old City of Ghadames
Source: Municipality of Ghadames City, Libya

Figure 12: Life around Ain Al-Faras

connection the community has with the spring, reinforcing its role as a cultural and social hub. Through such social functions, the Old City of Ghadames exhibits resilience, remaining a relevant and cherished part of its people's lives.

Moreover, the presence of architectural features such as the water distribution system and the tinnaot ventilation openings illustrates that the resilience of the Old City of Ghadames is not solely due to its physical structure, but also to the social infrastructure that governs daily life. These elements facilitated a sustainable and cooperative lifestyle, reinforcing the social fabric of the city. The design of Ghadames thus reflects a comprehensive approach to urban planning, where every element serves multiple functions, enhancing both the quality of life and the resilience of the community. This holistic integration of physical and social components is a key reason why the Old City of Ghadames remains resilient, fostering continuity in both cultural practices and community life.

The Old City of Ghadames stands as a remarkable example of how the built environment can foster resilience through social use. The elements discussed above, from ventilation systems to water management, reflect a community deeply attuned to both its environment and its social fabric. These features not only enhanced the physical comfort of the inhabitants, but also played a key role in nurturing a strong communal spirit, which is essential for the resilience of any cultural heritage site.

Although the Old City of Ghadames no longer serves as a permanent residence, these traditional elements continue to support the social activities that take place within its walls. This ongoing use ensures that the city's cultural vitality remains intact, with residents and visitors alike engaging in the cultural practices that have sustained the community for centuries. The resilience of Ghadames lies not just in the preservation of its physical structures, but in the continuation of its social functions, making it a living testament to the enduring bond between the people and their heritage.

New Gourna vs. Old City of Ghadames: A Contrast in Resilience

The Old City of Ghadames and New Gourna offer contrasting examples of how communities interact with their built environment and heritage during times of modernisation. In Ghadames, the resilience of cultural heritage is demonstrated through the active participation of residents in the preservation and adaptation of their environment. The city has managed to integrate modern amenities without losing its

traditional architectural identity and community structures. This ongoing balance of adaptation and modernisation has allowed the Old City of Ghadames to remain inhabited and culturally relevant, fostering social cohesion and continuity.

In contrast, New Gourna serves as an example of the failures that can arise when top-down approaches are applied to cultural heritage. The relocation of the Old Gourna residents, imposed without sufficient community involvement, led to a disconnection from the new environment and a rejection of the designed spaces. The residents, unable to relate to the new architecture, felt alienated, highlighting how resilience can also manifest as resistance against unwanted change. This resistance shows the importance of community participation in heritage preservation. While New Gourna was meant to preserve cultural identity through innovative architectural solutions, it ultimately failed to foster resilience because it did not consider the practical needs and cultural identity of the people for whom it was designed.

Both New Gourna and Old Ghadames experienced modernisation, but the outcomes were markedly different. While Ghadames displayed resilience by adapting to change and maintaining a strong cultural identity, New Gourna struggled with displacement and the loss of community connection. This comparison clearly illustrates that cultural heritage alone does not guarantee resilience; rather, it is the active involvement of the community in the preservation process that ensures long-term success. A community-driven approach to preservation, which respects local traditions and addresses practical needs is essential for fostering true resilience. Table 2 shows the summary of comparison between Old City of Ghadames and the New Gourna.

Conclusions

The resilience of cultural heritage homes extends far beyond their physical preservation; it encompasses the adaptability of communities, the retention of cultural significance, and the integration of heritage into contemporary

Table 2: Summary of comparison between Old City of Ghadames and the New Gourna

Aspect	Old City of Ghadames	New Gourna
Approach to Modernisation	Integration of modern amenities while preserving traditional architecture.	Top-down, imposed relocation, and architecture.
Community Involvement	High community involvement in preserving and adapting the built environment.	Minimal community involvement in the design and relocation process.
Social and Cultural Continuity	Maintained cultural practices and social structures, supporting community cohesion.	Disconnected residents from their heritage and social cohesion.
Architectural Identity	Traditional architecture preserved while adapting to modern needs.	New architectural style that residents rejected.
Resilience	Positive resilience through adaptation, continued habitation, and cultural vitality.	Negative resilience: Resistance against unwanted change and loss of sense of belonging.
Impact of Preservation Efforts	Successful preservation due to understanding of community's cultural identity and needs.	Failed preservation due to disregard for cultural identity and practical needs.
Cultural Heritage as Resilience	Cultural heritage remained relevant and actively used, providing resilience.	Cultural heritage struggled to remain relevant due to disconnect between residents and new environment.

social life. This article has highlighted the critical need to understand and mitigate the risk factors that threaten cultural heritage. By applying theoretical frameworks that view cultural heritage as an evolving narrative rather than a static legacy, valuable insight into the transformative processes that contribute to resilience is gained.

Through the case studies, with a particular focus on the Old City of Ghadames, it becomes clear that resilience is closely tied to social use. The city's traditional architectural elements—such as its water distribution systems and ventilation openings—combined with the social practices surrounding Ain Al-Faras, the "Horse spring" illustrate how cultural heritage can continue to play a vital role in the community's social fabric. The ongoing use of these spaces for social functions, even as populations move and lifestyles change, underscores the enduring connection between people and their heritage.

However, the case of New Gourna has shown that resilience cannot be taken for granted. The experience of New Gourna emphasises that the imposition of architectural change without community participation can result in resistance rather than adaptation. Cultural heritage does not automatically guarantee resilience; it requires active engagement with the community, considering their needs, cultural identity, and practical realities.

The resilience of cultural heritage homes is not merely about withstanding the test of time—it involves evolving with time. True resilience requires active stewardship, creative adaptation, and an ongoing recognition of social use as a core component of cultural vitality. As demonstrated in the Old City of Ghadames, the sustainable use of heritage sites for social purposes can preserve not only the physical structures, but also the intangible aspects of culture that give these spaces their intrinsic value. Modernisation, when approached in a participatory way, can reinforce this resilience by ensuring that heritage remains relevant in the face of changing social dynamics.

Ultimately, this article advocates for a comprehensive approach to heritage conservation that embraces change, encourages social engagement, and fosters resilience, ensuring that cultural heritage homes continue to enrich our societies and bear witness to our shared history. Heritage conservation must therefore be seen as a dynamic process, in which the community plays an active role in ensuring that the past remains a living, evolving part of our present and future.

Acknowledgements

The authors would like to sincerely thank the Editorial Board and reviewers of the journal for reviewing and providing comments on the article's content.

Conflict of Interest Statement

The authors declare that they have no conflict of interest.

References

Adger, W. N. (2000). Social and ecological resilience: Are they related? *Progress in Human Geography*, *24*(3), 347-364.

Ahmed, K. G., & El-Gizawy, L. (2010). The dilemma of sustainability in the development projects of rural communities in Egypt–The case of New Gourna. *International Journal of Sustainable Development and Planning*, *5*(4), 407.

Ahmed, Z., Le, H. P., & Shahzad, S. J. H. (2022). Toward environmental sustainability: How do urbanisation, economic growth, and industrialisation affect biocapacity in Brazil? *Environment, Development and Sustainability*, *24*(10), 11676-11696.

Alvord, M. K., & Grados, J. J. (2005). Enhancing resilience in children: A proactive approach. *Professional Psychology: Research and Practice*, *36*(3), 238.

Ashworth, G. J., & Tunbridge, J. E. (2000). *A geography of heritage: Power, culture, and economy*. Arnold.

Assmann, J., & Czaplicka, J. (1995). Collective memory and cultural identity. *New German Critique*, (65), 125-133.

Atamtürk, B. (2022). *Adapting to abandonment: Sustainability of depopulated historic rural land-scapes, the case of nallidere* [Master's thesis, Middle East Technical University].

Bagheri, A., & Hjorth, P. (2007). Planning for sustainable development: A paradigm shift towards a process-based approach. *Sustainable Development*, *15*(2), 83-96.

Barker, R. G. (1968). *Ecological psychology.*

Blankenship, K. M. (1998). A race, class, and gender analysis of thriving. *Journal of Social Issues*, *54*(2), 393-404.

Blavier, C. L. S., Huerto-Cardenas, H. E., Aste, N., Del Pero, C., Leonforte, F., & Della Torre, S. (2023). Adaptive measures for preserving heritage buildings in the face of climate change: A review. *Building and Environment*, 110832.

Bleibleh, S., & Awad, J. (2020). Preserving cultural heritage: Shifting paradigms in the face of war, occupation, and identity. *Journal of Cultural Heritage*, *44*, 196-203.

Bowen, G. L. (1998). *Community resiliency: A research roadmap*. Chapel Hill, NC: University of North Carolina at Chapel Hill, School of Social Work.

Bowen, G. L., & Martin, J. A. (1998). Community capacity: A core component of the 21st century military community. *Military Family Issues: The Research Digest*, *2*(3), 1-4.

Caneva, G., Nugari, M. P., & Salvadori, O. (1991). *Biology in the conservation of works of art*.

Canter, D. (1997). The facets of place. *Advances in Environment, Behaviour, and Design*, *4*.

Center, A. D. R. (2015). *Sendai framework for disaster risk reduction 2015-2030.* United Nations Office for Disaster Risk Reduction: Geneva, Switzerland.

Chapagain, N. K. (2023). Scope and limitations of heritage-based resilience: Some reflections from Nepal. *Built Heritage*, *7*(1), 12.

Chigbu, U. E. (2015). Repositioning culture for development: Women and development in a Nigerian rural community. *Community, Work & Family*, *18*(3), 334-350.

David, J., & Hammond, R. (2011). *High Line: The inside story of New York City's Park in the sky*. FSG Originals.

DeSilvey, C. (2017). *Curated decay: Heritage beyond saving*. University of Minnesota Press.

Fathy, H. (2000). *Architecture for the poor: An experiment in rural Egypt.* University of Chicago Press.

Frankel, H., Snowden, L. R., & Nelson, L. S. (1992). Wives'adjustment to military deployment: An empirical evaluation of a family stress model. *International Journal of Sociology of the Family*, 93-117.

Fullilove, M. T., & Saul, J. (2006). *Rebuilding communities post-disaster in New York.* Cambridge University Press.

Gibson, J. J. (2014). *The ecological approach to visual perception: Classic edition.* Psychology Press.

Gu, Z. (2018). *An analysis of architectural and urban planning strategies for developing energy efficient cities in China* [Doctoral dissertation, KTH Royal Institute of Technology].

Hassler, U., & Kohler, N. (2014). Resilience in the built environment. *Building Research & Information*, *42*(2), 119-129.

Hawley, D. R., & DeHaan, L. (1996). Toward a definition of family resilience: Integrating life-span and family perspectives. *Family Process*, *35*(3), 283-298.

Heritage, U. I. C., & Rii, P. (2020). Convention for the safeguarding of the intangible

cultural heritage. In *Proceedings of the Report of the Eleventh Annual Coordination Meeting of Category* (Vol. 2).

Hernández, B., Hidalgo, M. C., Salazar-Laplace, M. E., & Hess, S. (2007). Place attachment and place identity in natives and non-natives. *Journal of Environmental Psychology*, *27*(4), 310-319.

Holtorf, C. (2018). Embracing change: How cultural resilience is increased through cultural heritage. *World Archaeology*, *50*(4), 639-650.

Holtorf, C., & Kristensen, T. M. (2023). Reconsidering heritage destruction and sustainable development in a long-term perspective. In *The Routledge handbook of heritage destruction* (pp. 413-423). Routledge.

Ingold, T. (2021). *The perception of the environment: Essays on livelihood, dwelling and skill*. Routledge.

Jigyasu, R. (2002). Reducing disaster vulnerability through local knowledge and capacity. The cace of earthquake prone rural communities in India and Nepal. *Fakultet for arkitektur og billedkunst*.

Kaplan, C. P., Turner, S., Norman, E., & Stillson, K. (1996). Promoting resilience strategies: A modified consultation model. *Children Schools*, *18*(3), 158-168.

Lam, P. T., Chan, E. H., Poon, C. S., Chau, C. K., & Chun, K. P. (2010). Factors affecting the implementation of green specifications in construction. *Journal of Environmental Management*, *91*(3), 654-661.

Lavell, A., & Maskrey, A. (2014). The future of disaster risk management. *Environmental Hazards*, *13*(4), 267-280.

Lizarralde, G., Chmutina, K., Bosher, L., & Dainty, A. (2015). Sustainability and resilience in the built environment: The challenges of establishing a turquoise agenda in the UK. *Sustainable Cities and Society*, *15*, 96-104.

Maclean, K., Cuthill, M., & Ross, H. (2014). Six attributes of social resilience. *Journal of Environmental Planning and Management*, *57*(1), 144-156.

Mat Lazim, M. S. (2020). Evolution of migration for urban and rural. *Department of Statistics Malaysia*, 1-5.

McCubbin, H. I., Cauble, A. E., & Patterson, J. M. (1982). *Family stress, coping, and social support* (pp. 26-47). Springfield: Thomas.

McKnight, J. L. (1997). A 21st-century map for healthy communities and families. *Families in Society*, *78*(2), 117-127.

Mehta, V. (2013). *The street: A quintessential social public space*. Routledge.

Norris, F. H., Stevens, S. P., Pfefferbaum, B., Wyche, K. F., & Pfefferbaum, R. L. (2008). Community resilience as a metaphor, theory, set of capacities, and strategy for disaster readiness. *American Journal of Community Psychology*, *41*, 127-150.

Omer, A. M. (2017). Identifying, developing, and moving sustainable communities through application of bioenergy for energy or materials: Future perspective through energy efficiency. *International Journal of Life Sciences*, *1*(1), 9-39.

Papadaki, M., & Kalogeraki, S. (2017). Social support actions as forms of building community resilience at the onset of the crisis in urban Greece: The case of Chania. *Partecipazione e Conflitto*, *10*(1), 193-220.

Pearlin, L. I., & Schooler, C. (1978). The structure of coping. *Journal of Health and Social Behavior*, 2-21.

Plevoets, B., & Van Cleempoel, K. (2011). Adaptive reuse as a strategy towards conservation of cultural heritage: A literature review. *WIT Transactions on The Built Environment*, *118*, 155-164.

Polk, L. V. (1997). Toward a middle-range theory of resilience. *Advances in Nursing Science*, *19*(3), 1-13.

Pynoos, J., Nishita, C., Cicero, C., & Caraviello,

R. (2008). Aging in place, housing, and the law. *Elder LJ*, *16*, 77.

Rapoport, A. (1990). *The meaning of the built environment: A nonverbal communication approach*. University of Arizona Press.

Sagone, E., & De Caroli, M. E. (2014). A correlational study on dispositional resilience, psychological well-being, and coping strategies in university students. *American Journal of Educational Research*, *2*(7), 463-471.

Saleebey, D. (1997). Community development, group empowerment, and individual resilience. *The Strengths Perspective in Social Work Practice*, 199-216.

Sesana, E., Gagnon, A. S., Ciantelli, C., Cassar, J., & Hughes, J. J. (2021). Climate change impacts on cultural heritage: A literature review. *Wiley Interdisciplinary Reviews*: *Climate Change*, *12*(4), e710.

Sjostrom, C., & Bakens, W. (1999). CIB Agenda 21 for sustainable construction: Why, how and what. *Building Research & Information*, *27*(6), 347-353.

Smith, L. (2006). *Uses of heritage.* Routledge.

Stanley, D. J., & Warne, A. G. (1993). Sea level and initiation of Predynastic culture in the Nile delta. *Nature*, *363*(6428), 435-438.

Stipe, R. E. (Ed.). (2003). *A richer heritage: Historic preservation in the twenty-first century*. University of North Carolina Press.

Tawab, A. G. A. (2014). The World Heritage Centre's approaches to the conservation of New Gourna Village, and the assessment of its authenticity and integrity. *Alexandria Engineering Journal*, *53*(3), 691-704.

Tidball, K., & Stedman, R. (2013). Positive dependency and virtuous cycles: From resource dependence to resilience in urban social-ecological systems. *Ecological Economics*, *86*, 292-299.

Van Breda, A. D. (2001). Resilience theory: A literature review. *Pretoria, South Africa: South African Military Health Service*, *613*.

Vijay, P. V., Tulasi Gadde, K., & GangaRao, H. V. (2019). Structural evaluation and rehabilitation of century-old masonry and timber buildings. *Journal of Architectural Engineering*, *25*(2), 05019001.

Vischer, J. C. (2008). Towards a user-centred theory of the built environment. *Building Research & Information*, *36*(3), 231-240.

Walsh, F. (2003). Family resilience: A framework for clinical practice. *Family Process*, *42*(1), 1-18.

Werner, E. E., & Smith, R. S. (2019). *Overcoming the odds: High risk children from birth to adulthood.* Cornell University Press.

Zhang, L., & Zhao, S. X. (2009). City branding and the Olympic effect: A case study of Beijing. *Cities*, *26*(5), 245-254.

Zolkoski, S. M., & Bullock, L. M. (2012). Resilience in children and youth: A review. *Children and Youth Services Review*, *34*(12), 2295-2303.