Climate change related urban transformation and the role of cultural heritage

Matthias Ripp & Christer Gustafsson
(Eds.)

Foreword by Claire Cave

IL Sileno Edizioni

Geographies of the Anthropocene

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Matthias Ripp & Christer Gustafsson
Editors

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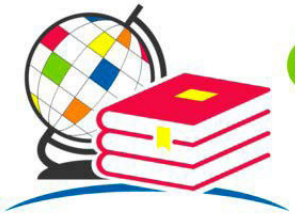

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The book series “Geographies of the Anthropocene” edited by the Scientific International Publisher “Il Sileno” (Il Sileno Edizioni) will discuss the new processes of the Anthropocene epoch through the various worldviews of geoscientists and humanists, intersecting disciplines of Geosciences, Geography, Geoethics, Philosophy, Socio-Anthropology, Sociology of Environment and Territory, Psychology, Economics, Environmental Humanities and cognate disciplines.

Geoethics focuses on how scientists (natural and social), arts and humanities scholars working in tandem can become more aware of their ethical responsibilities to guide society on matters related to public safety in the face of natural hazards, sustainable use of resources, climate change and protection of the environment. Furthermore, the integrated and multiple perspectives of the Environmental Humanities, can help to more fully understand the cultures of, and the cultures which frame the Anthropocene. Indeed, the focus of Geoethics and Environmental Humanities research, that is, the analysis of the way humans think and act for the purpose of advising and suggesting appropriate behaviors where human activities interact with the geosphere, is dialectically linked to the complex concept of Anthropocene.

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The choice of digital Open Access format is coherent with the flexible structure of the series, in order to facilitate the direct accessibility and usability by both authors and readers.

Contents

8. From Tradition to Resilience: The Value of Balinese Adaptive Culture in Climate Change Adaptation and Heritage Management

Diana Farisah Rahman[1]

Abstract

The Subak Landscape of Bali Province was inscribed as a World Heritage Site in 2012 for its exceptional irrigation system that links to the *Tri Hita Karana* philosophy, which emphasizes the importance of maintaining a harmonious relationship between humans, the spiritual realm, nature, and fellow human beings. Farmers and local communities have faced a growing challenge in safeguarding their livelihood and ensuring the productivity of rice fields. Although tourism has long been a key aspect of Balinese society, it is important to recognize that challenges in the agricultural sector have led many people to abandon farming in favor of jobs in the tourism industry. The disruption of this agricultural society by the global climate crisis is frequently overlooked.

Extreme drought, heavy rainfall, and flooding have significantly affected rice production and the social and economic sustainability of farmers and urban landscapes.

These changes in livelihood and agricultural practices, driven by the climate crisis as much as by tourism, have transformed Balinese villages and communities. Such transformations have brought about both negative and positive impacts on the Balinese built heritage. The Balinese's perception of heritage value and change have contributed to the adaptive characteristic of Balinese cultural heritage, leading them to normalize physical transformations. While there are consequences associated with this approach, it has been demonstrated that the shift in livelihoods and land use, which potentially jeopardize the World Heritage Status, is linked to the preservation of the Balinese culture and society that face destruction due to environmental changes. This serves as a compelling illustration of how climate resilience and heritage preservation are interconnected.

[1] Institute for Sustainable Heritage, Upper Woburn Place 14, London, WC1H 0NN. dianarahman90@gmail.com.

Scholars and intergovernmental organizations consistently emphasize the pivotal role of local, indigenous, and traditional knowledge in climate change adaptation, disaster risk reduction, and biodiversity protection (Hulbert *et al.,* 2019; Raygorodetsky, 2011). This paper aims to explore the role of the Balinese culture in climate change adaptation as well as examine the impact of the climate crisis on the Balinese cultural heritage, including traditional knowledge, livelihoods, and urban landscape. It is important to acknowledge that varying interpretations of heritage preservation exist between international and local communities, often resulting in the marginalization of local and indigenous knowledge in heritage management (Rakic & Chambers, 2008; Taylor, 2009; Staiff & Bushell, 2013; Suntikul & Jachna, 2013; Cocks *et al.,* 2018). Using the subak landscape as a case study, this paper also seeks to explore the potential of local and indigenous knowledge as a bridge for integrating climate actions and heritage preservation.

Keywords

Adaptive culture, agriculture, climate change adaptation, resilience, subak landscape

1. Introduction

Indigenous communities are among the most vulnerable groups that are most affected by the climate crisis (Laduzinsky, 2019; ILO, 2017). Many indigenous communities also live in geographically high-risk areas and are threatened by extreme weather and its impacts, including floods, droughts, and the rise of seawater levels (UN Department of Economic and Social Affairs, 2019). Some scholars noted that indigenous people have various coping strategies to overcome the impacts of climate change which help mitigate their vulnerability (Garai *et al.,* 2022; Wardekker *et al.,* 2023). However, indigenous communities are yet adequately involved in climate actions due to the lack of engagement instruments and adequate policies (McDowell *et al.,* 2016; Pearce *et al.,* 2009; David-Chavez & Gavin, 2018; UNDRR, 2023).

The impacts of the climate crisis on heritage sites are also notable. Extensive evidence of the threats posed by the climate crisis to cultural and natural heritage sites are recorded all over the world (e.g. by Fatorić & Seekamp

2017; Sesana *et al.,* 2018; Dastgerdi *et al.,* 2019). UNESCO records that at least 83 of 252 natural World Heritage Sites are threatened by climate change, including the Great Barrier Reef in Australia and the Cape Floral Region in South Africa (UNESCO, 2020). Mansourian *et al.,* (2009) and Scheuren *et al.,* (2007) also raised their concerns that climate change has destroyed protected areas which are among the most effective tools to protect the earth's biodiversity, maintain natural ecosystems, and contribute to physical protection against natural hazards and disasters.

More research now demonstrates the benefits of integrating heritage preservation and climate adaptation on heritage sites and their communities (e.g. Tengo *et al.,* 2014; Berkes & Armitage, 2010; Berkes *et al.,* 2006; Wardekker *et al.,* 2023; Chapagain, 2023). There is also a growing recognition that cultural and heritage studies have more to offer for understanding climate action than is currently acknowledged (Simpson *et al.,* 2022; Kohler & Rockman, 2020; Chapagain, 2023). For instance, indigenous knowledge provides a further understanding of the actual impacts of the climate crisis and possible ways to adapt (Savo *et al.,* 2016). In Bolivian Andes, indigenous knowledge helps the community to understand climate variability and changes that affect their crops (Boillat, 2013).

Despite all that, efforts to integrate indigenous knowledge into heritage preservation or climate actions have been insufficient. Sectoral gaps, lack of stakeholder coordination, lack of inclusivity, and marginalization of indigenous knowledge are among the most common obstacles to local engagement in climate actions (Ford *et al.,* 2016). The lack of policy integration and multi-sectoral coordination are also mentioned as threats to heritage sites, their values, and the integrity facing the climate crisis (UNDRR, 2023).

Therefore, this chapter aims to explore the contribution of indigenous knowledge and cultural heritage to climate adaptation and resilience. It uses the example of the traditional irrigation system of subak and its community that shows how an adaptive culture helps to manage cultural heritage and reduce their vulnerability to climate change. This chapter also investigates the impacts of the climate crisis on the preservation of the subak landscape, explaining the interlinkages between heritage preservation and climate actions. The Balinese traditional knowledge has helped the subak community in sustaining rice production despite the changing landscape. Nevertheless,

some challenges exist as locals attempt to align their adaptive culture with the World Heritage Site management standard. Inadequate government support is recorded as one of many obstacles in reducing the community's vulnerability to climate-related disasters.

Ethnography emerged as the chosen research methodology, strategically selected to navigate the challenges posed by the local community's reluctance to engage openly with formal research and governmental activities. As highlighted by Creswell (2013), ethnography proves effective in delving into the beliefs, meanings, behaviours, and critical issues such as power dynamics within a cultural group. Spanning the years 2017 to 2019, around 50 respondents were engaged in a mix of semi-structured and unstructured interviews across diverse settings.

To enrich the study, a systematic review of secondary data from sources like the World Heritage Site nomination dossiers, State of Conservation reports, and national heritage and climate policies was conducted. This broader perspective aimed to deepen the understanding of the subak system, the subak community, and the World Heritage Site framework. Both the primary and secondary data were analysed using a qualitative content analysis.

2. The subak system and its current challenges

The subak landscape was inscribed as a World Heritage Site in 2012 under the name of 'the Cultural Landscape of Bali Province'. These six clusters of rice fields include lakes, forests, temples, customary villages, and irrigation systems. The subak landscape is considered an Outstanding Universal Value for demonstrating a complex farming system and being a manifestation of the Balinese traditional philosophy of *Tri Hita Karana*. This philosophy, translated in English as three good causes, calls upon the community to maintain a harmonious relationship with nature, the spiritual world, and other human beings.

The subak landscape is classified as an evolving cultural landscape that has both tangible and intangible elements. It represents a holistic farming system that incorporates social, religious, and agricultural components. The sustainability of shared water management, the rituals conducted at water temples, and the cooperative spirit among farmers are integral to the landscape. The subak landscape is the only rice terrace in the region that extends beyond

traditional cultivation, embodying the cultural and religious values unique to the island.

Some of the main components of the subak landscape are rice terraces, water temples, the subak organization, and subak regulations (*awig-awig*). The resilience of the subak system is evident through the pivotal roles played by these components. The intricate design of the rice terraces, for example, enables efficient water distribution and cultivation, supported by the water temples that are not only important as a place of worship but also central to the management of water resources.

Within the subak landscape, farmers convene under the umbrella of the subak organization, an important entity responsible for coordinating irrigation schedules and mediating conflicts among farmers. The regulatory framework of a*wig-awig* outlines guidelines pertaining to farming and irrigation. It serves the essential purposes of ensuring an equitable water distribution, averting the over-exploitation of nature, and fostering adaptability to environmental changes. The seamless interconnection and effective functioning of these components are paramount in ensuring a resilient subak system.

Figure 1. The subak landscape.
Source: Diana Rahman, 2018

As in the case of many World Heritage Sites, there are some discrepancies among different stakeholders of World Heritage Sites in interpreting the value of sites. In the subak landscape, this occurs due to cultural and knowledge gaps, lack of local community engagement, and different perceptions towards the landscape (Rahman, 2021). Currently, the subak landscape holds significant value for the local community residing in and around the site, serving as both a source of income and a link between the rice fields' owners and their ancestors. The local community views the subak system as a seamless integration of social elements, agricultural techniques, and religious rituals, perceiving the site through the lens of these components and interpreting its significance based on the interplay and relationship among them (Rahman & Fouseki, 2022). Currently, various interpretations of the subak landscape result in different understandings among stakeholders regarding the characteristics and attributes of the landscape. Consequently, it also results in different interpretations of the most suitable management approach.

The State of Conservation (SOC) report for a World Heritage Site is a collaborative effort between the UNESCO World Heritage Centre and the national government of the host country. This comprehensive report provides a detailed overview of site management, identifies present challenges, and provides recommendations from the World Heritage Committee for safeguarding the site's Outstanding Universal Value. The latest SOC report of the subak landscape highlighted significant changes that pose a threat to its values, primarily stemming from a lack of awareness and understanding within the local community regarding World Heritage Site preservation. This is a misconception that is not unique to the subak landscape but is a widespread issue in many World Heritage Sites, where local communities are often unfairly deemed less knowledgeable based on their different perspectives and approaches (Maikhuri *et al.,* 2001; Maruyama *et al.,* 2016; Al-Harithy, 2005). The report further emphasized that the local community's valuation of the subak landscape has changed over time. However, one could argue that other stakeholders may have had different conceptualizations of the landscape, leading to inaccurate interpretations of how the local community values the site.

Currently, the subak community has faced not only challenges related to landscape and heritage management but also challenges related to rice production. The climate crisis brought negative impacts on agricultural activities and natural resources in Bali. For instance, water scarcity is a pressing concern among the subak farmers. Erratic monsoons and unpredictable rain-

fall patterns have disrupted the plantation schedule and harvest plans, and in some cases, led to the complete destruction of rice fields. Farmers have also reported prolonged drought seasons that have significantly degraded soil fertility and rice yields.

Socio-economic and cultural changes, including shifting demographics, education, and economic opportunities have affected the subak system, especially as many young generations choose alternative livelihoods, leading to a decline in the number of subak farmers. Bali's popularity as a tourist destination has also caused rapid urbanization and rapid growth of tourism-related infrastructure, which triggered land use change and disrupted water resources. Modernization and technology adoption may also disrupt the subak system by affecting community-based decision-making processes and the community's relationships with each other.

However, Rahman's (2021) observations noted that the transformations of the subak landscape - including its farming system - are primarily the local community's responses to environmental changes. For example, the change in the selection of local rice varieties is a direct response to the evolving climate and environmental conditions, which has led farmers to opt for more robust rice varieties that can endure increasingly severe climates. Similarly, the adoption of modern farming tools instead of traditional ones aims to reduce labour time, enabling farmers to seek additional employment opportunities to cope with the escalating costs associated with rice cultivation.

These adaptive measures can bring both advantages and disadvantages for the sustainability of the subak system and the local community. However, these practices must be carefully considered and included in the development of a management strategy for the World Heritage Site as this links to the local community's approach to coping with challenges posed by climate change.

3. Transformation and adaptation through the Balinese perspective

In addition to the transformations in farming tools, rice varieties, and intangible elements, the subak landscape has also undergone physical transformations. Many rice terraces have been converted into residential buildings, homestays, restaurants, or abandoned due to various factors. Often, renovations of subak temples also incorporate new materials, designs, and functionalities. The facades and structures of houses, villages, and communal areas

have also undergone many transformations, often driven by the local community's need to accommodate the expanding number of family members and facilitate tourism-related activities.

Physical changes are evident throughout Bali and the subak landscape. These modifications - both the process and the outcome - are regarded as integral to Balinese traditional culture. The adaptability of Balinese culture has long been recognized through various studies (Eiseman Jr, 1990; Vickers, 2012). The Balinese community itself is renowned for its ability to assimilate other cultures, embracing change as an inherent part of their traditional practices, and not at all accustomed to static conditions (Hobart, 2016; Picard, 1996). Balinese society views innovation as a means to conserve both their cultural heritage and the natural environment. For example, the introduction of innovative religious offerings has allowed the community to conduct ceremonies without overexploiting natural resources. Similarly, many modifications implemented in the subak landscape are intended to enable farmers to safeguard rice production and their livelihoods.

The Balinese culture plays a fundamental role in the operation of the subak landscape, providing guidance on religious ceremonies and fostering cooperation among farmers, which form the essence of the subak system. An essential principle within this culture is *Rwa Bhineda,* which embodies the Balinese belief in maintaining harmony and equilibrium between opposing elements, dismissing the notion of a strict positive-negative or good-bad dichotomy. (Eiseman Jr, 1990). The principle of *Desakalapatra* also underscores the significance of change, urging the Balinese to adjust their actions and interpretations according to varying places, times, and circumstances. These principles have contributed to the Balinese's resilience against various changes, including political, economic, and environmental changes. In terms of heritage preservation, these philosophies influence the values of numerous heritage sites in Bali, accentuating the intangible aspects over their physical dimensions.

The adaptability of the subak system and the Balinese community plays a crucial role in enhancing their resilience to climate change. Scholars have recognized resilience as the system's ability to absorb disturbances (Gunderson & Holling, 2002) a quality that arguably prevents the Balinese from succumbing to a negative state. From an indigenous standpoint, Todd (2015) and Lin, *et al.,* (2020) view resilience as an ongoing, dynamic process of

cultural and ecological adaptation and transformation in the face of global climate change. They emphasize that resilience is not merely about survival, but also about thriving and flourishing for both human and non-human species. Berkes & Ross (2013) also argue that a community's adaptive capacity relies not only on their existing adaptation skills but also on their ability to synthesize knowledge from various sources—an attribute that can be observed within the Balinese community.

According to Berkes *et al.,* (1994), traditional knowledge also represents years of ecological adaptation of a community to their environments, playing a vital role in bolstering their resilience. However, traditional knowledge is not always aligned with many 'scientific approaches' to heritage preservation or climate adaptation. Research has shown that many dynamic communities and cultures often clash with the conservation principles outlined in the World Heritage Convention, resulting in tensions among heritage stakeholders (Al-Harithy, 2005; Cocks, *et al.,* 2018; Meskell, 2002; Winter, 2014). For instance, the adaptive nature of the Balinese community is in contrast with the concept of authenticity, posing challenges in managing the World Heritage Site.

The pictures below show the condition of the main road in a customary village that leads to one of the main water temples of subak (top left picture). As tourists started visiting the area, local shops emerged, providing the local community with an extra source of income alongside their poorly compensated farming jobs. Contrasting with the main street, the neighbouring street (bottom left) still maintains the traditional appearance of a Balinese compound. Note, however, that changes in terms of materials and function have occurred inside the house compound, including the establishment of small homestays (bottom right). A parking lot was built several years ago to manage parking and prevent traffic congestion, although it no longer adequately accommodates the growing number of tourists. Once the temple admission closes at 5 p.m., the parking lot reverts to being a communal space for local activities (top right).

Figure 2. Condition of one of the customary villages.
Source: Diana Rahman, 2018

The rice terraces themselves have undergone additional changes. The below images show a cemented irrigation canal constructed to address water leakage issues and mitigate water scarcity problems faced by farmers (top left). The paths traversing through the rice terraces have also been renovated using more durable materials to provide easier access for farmers to their fields (bottom left). These paved paths also serve the purpose of safeguarding the rice fields against damage caused by visitors and tourists. More buildings have been built in rice terraces as farmers seek to have cooler and weather-resistant spaces to rest or store their tools (bottom right). Within the subak temple, a small meeting hut has been replaced with a permanent multi-functional space to accommodate various activities that have emerged since the subak's designation as a World Heritage Site (top right).

Figure 3. Change in the subak landscape.
Source: Diana Rahman, 2018

This research suggests that the transformation of the subak landscape and customary villages should be viewed through the lens of both heritage management and climate action. The Balinese culture facilitates innovation as a means of fostering local resilience and a mechanism to temper excessive change, striking a balance between progress and preservation. It is worth noting that these innovative measures may not fully align with certain international conservation standards. Nonetheless, their consideration is crucial for ensuring the sustainability of the local community's way of life, knowledge, and practices, thus should be given due attention in future planning endeavours.

4. Discussion

Climate change contributes directly and indirectly to the transformation of the subak landscape and its customary villages, an important fact that is often

overshadowed by the rapid growth of tourism within the community. The direct influence of climate change on the subak system, and by extension, the Balinese culture, is manifested in the transformation of the subak landscape and the farming practices. These changes hold intrinsic value, representing the adaptive nature of Balinese culture and the community's interpretation of the interconnectedness between culture and nature. The indirect impact of climate change is predominantly observed within customary villages, where the growth of the tourism industry coincides with the decline in rice crops and the uncertainty of weather patterns hindering rice production.

These transformations demonstrate the utilization of indigenous knowledge to revitalize traditional practices and underscore its role in fostering a resilient community. As highlighted by Lee & Chen (2021), indigenous knowledge plays a crucial role in enabling community members to cope with environmental hazards. By incorporating indigenous knowledge into heritage preservation efforts, we can gain an understanding of how to establish a climate-resilient heritage. Instead of imposing international conservation standards, empowering local communities to employ their own approaches can significantly contribute to enhancing their resilience to climate change. On the contrary, neglecting indigenous practices only increases the vulnerability of heritage sites and society to the impacts of climate change. Additionally, Yeh *et al.,* (2021) demonstrate that cultural and heritage conservation is a dynamic and diverse process that is and always embedded in social and cultural contexts. This understanding provides a justification for adopting a locally led conservation approach.

The subak organization itself serves as an exemplary co-creation space, facilitating negotiations between farmers and traditions. It plays a vital role in establishing boundaries to manage potential cultural and physical transformations in the landscape while simultaneously incorporating innovative knowledge to address evolving environmental conditions. As such, the sustainability of this organization holds significance not only for sustaining rice production and safeguarding the subak system as a cultural heritage but also for developing effective climate adaptation strategies. Unfortunately, tensions among farmers or between farmers and their leaders have become prevalent in many areas within the subak landscape. These tensions have the potential to disrupt the harmonious functioning of the subak organization.

That being said, it becomes crucial to rethink our interpretation of the ten-

sions and dynamics between global and local approaches in heritage management. One prevalent notion is the perceived lack of knowledge or awareness among locals when it comes to preserving heritage sites. There are two issues associated with this notion. Firstly, assessments are often conducted by "experts" who are unfamiliar with the site's conditions or lack a comprehensive understanding of the community's culture. Their interactions typically consist of limited encounters or superficial "in-depth" interviews with the community. Secondly, these "experts" tend to interpret the actions of the local community in isolation or from a singular sector's perspective. It is important to recognize that local knowledge and practices are not shaped by a single-sector approach but rather by a multi-sectoral approach.

According to Gonzales (2013), we cannot ignore indigenous autonomy in conservation as indigenous conservation strategies are inherently holistic and rooted in culture and profound connection to the land, territory, spirituality, language, and worldview. Despite the study, there has been limited community involvement in determining conservation strategies, including inadequate consultation during the World Heritage nomination process of the subak landscape. As a result, the management of the site has proven to be ineffective, leading to tensions between the local community and the government.This situation has raised important questions about the purpose of conservation efforts and who will benefit, as voiced by many farmers and residents who feel disadvantaged by the World Heritage Site framework.

Similarly, Chen (2020) argued that the resilience of indigenous groups is embedded in the geographical, historical, cultural and political context, which implies that resilience strategies are not universally applicable. It is essential to integrate this understanding into the development of mitigation and adaptation strategies for World Heritage Sites, particularly due to their diversity. In this case it is important to view the interlinkages between heritage preservation and climate adaptation because they reflect the dynamic relationship between Balinese culture and the environment. By valuing and integrating Balinese innovative practices, we can utilize the unique characteristics of the culture in the preservation efforts while effectively addressing the challenges posed by climate change.

Strengthening the resilience of the subak system is contingent upon providing comprehensive support to the local community and their livelihoods. This entails not only enhancing the capabilities of local farmers in domains such as

climate change, sustainable tourism, and modern agricultural technology but also actively involving the community in decision-making processes. Tailored climate-resilient strategies specific to the subak system must be formulated. Additionally, extending financial support to farmers, facilitating market access, and creating robust regulations, monitoring, and evaluation systems are also imperative for the resilience and preservation of the subak landscape.

Therefore, while the subak community and the Balinese people possess skills to adapt to environmental change, this does not diminish the importance of government support. Many subak farmers have expressed disappointment in the lack of government support despite its existence, indicating a need for more targeted and effective governance. The involvement of local communities in governance is crucial to ensure the integration of their voices and indigenous knowledge into heritage management practices. Furthermore, an adaptive governance approach is necessary to effectively incorporate indigenous knowledge into climate change adaptation policies (Berkes *et al.,* 2021). Given the current top-down management approach of the subak landscape and the limited authority of the local community, without government support and involvement, the integration of heritage preservation and climate adaptation would remain unattainable.

5. Conclusion

The subak landscape undergoes various transformations that affect its tangible and intangible aspects, bringing benefits and disadvantages to the subak system and the local community. However, change itself, encompassing the process and outcome is considered an inherent part of Balinese traditional culture. The Balinese community is renowned for its adaptability and assimilation of other cultures, and this adaptability is reflected in the transformation of the subak system.

Climate change triggers the transformation of the subak system, impacting not only the rice fields themselves but also the society and customary villages where the local community resides. The traditional knowledge and practices of the Balinese people play a crucial role in managing potential changes in the landscape, while also incorporating innovative approaches to address evolving environmental conditions. This adaptive characteristic is instrumental in enhancing the local community's resilience to climate change.

Given that heritage management and resilience strategies cannot be universally applied, it becomes imperative to integrate indigenous and local knowledge in understanding heritage values and dynamic relationships between culture and nature within a community. This knowledge should serve as a crucial foundation for developing heritage management strategies and climate mitigation and adaptation plans, particularly for World Heritage Sites.

Drawing upon the subak organization as an example, this paper underscores the paramount importance of co-creation in formulating effective heritage management and climate adaptation strategies. Co-creation allows for an effective utilization of indigenous knowledge, providing a holistic understanding of landscapes within their socio-cultural contexts. It also enables the incorporation of multi-sectoral perspectives into heritage management strategies. The establishment of inclusive and adaptive governance is equally crucial to fostering seamless integration between heritage management and climate adaptation. Without such integration, there is a tangible risk of marginalizing local and indigenous knowledge, particularly in the face of prevalent scientific and international approaches, which pose a threat to the resilience of local communities and can lead to the degradation of their cultural heritage.

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Starting with a systemic understanding of cultural heritage, climate-change related urban transformation processes are analyzed through a multi-disciplinary lens and methods that blend the arts, humanities, and sciences. Governance-specific topics range from relevant cultural markers and local policies to stimulate resilience, to a typology of heritage-related governance and the vulnerability of historic urban landscapes. A variety of contributions from the Americas, Asia, and Europe describe and analyze challenges and potential solutions for climate-change related urban transformation and the role of cultural heritage. Contributions focusing on innovation, adaptation, and reuse introduce the concept of urban acupuncture, adaptive reuse of industrial heritage, and how a historical spatial-functional network system can be related to a smart city approach. The potential role of cultural traditions for resilience is analyzed, as is the integration of sustainable energy production tools in a historic urban landscape. Examples of heritage-based urban resilience from around the world are introduced, as well as the path of medium-technology to address climate adaptation and prevention in historic buildings. The contributions emphasize the need for an updated narrative that cultural heritage can also contribute to climate adaptation and mitigation.

Matthias Ripp, a senior heritage manager with a background of historical geography, is coordinating the "Old Town of Regensburg with Stadtamhof" site. He is active in numerous networks such as Heritage Europe and ICOMOS. He coordinated the EU HerO (Heritage as Opportunity) project and chairs the UNESCO world heritage working group on historic city centres of the German Association of Cities. Since November 2011 he has also been regional coordinator for the North West European and North-American region of the Organisation of World Heritage Heritage Cities (OWHC), is teaching at different Universities and works as a trainer, facilitator and consultant.

Christer Gustafsson, Ph.D. is Full Professor in Conservation at Uppsala University, Sweden. Currently, he is engaged as a member of the UNESCO Culture 2030 Indicators Expert Facility, an international expert group working with indicators for the United Nations' Sustainability Goals (Agenda 2045), Secretary-General for ICOMOS International Scientific Committee on Economics of Conservation as well as Chairman for EIT Culture & Creativity strategic topic group for Innovative, entrepreneurial and circular adaptive re-use of cultural heritage.