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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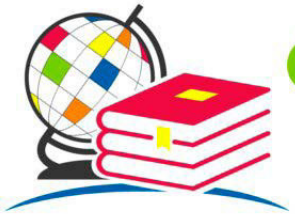

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Open Access and Peer-Reviewed series

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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.

The book series “Geographies of the Anthropocene” publishes online volumes, both collective volumes and monographs, which are set in the perspective of providing reflections, work materials and experimentation in the fields of research and education about the new geographies of the Anthropocene.

“Geographies of the Anthropocene” encourages proposals that address one or more themes, including case studies, but welcome all volumes related to the interdisciplinary context of the Anthropocene. Published volumes are subject to a review process (**double blind peer review**) to ensure their scientific rigor.

The volume proposals can be presented in English, Italian, French or Spanish.

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

Introduction

Climate Change related urban transformation and the role of cultural heritage

Matthias Ripp[1], *Christer Gustafsson*[2]

1. Scope

The book focuses on *Climate Change and urban transformation in cultural heritage* and the ambition is to bridge the gap between cultural heritage with its traditional narrative of conservation and preservation on the one side and increasingly rapid urban transformation and urban development based on the climate crisis and related disasters and risks on the other hand. The idea is to embrace a systemic understanding of cultural heritage and analyse urban transformation through a multi-disciplinary and integrated approach.

There is a bundle of diverse challenges, however, also conflicts related to urban transformation and cultural heritage. These challenges and conflicts can be related to the (unequal) distribution of wealth, health, access to common goods and different generations of users (Larondelle et al., 2016). In this book we want to focus on climate change as a meta-challenge and related risks and disasters and how these result in urban transformation processes. Cultural Heritage as an important resource not only for identification, well-being, quality of life and many other benefits (Ripp, 2022) is understood here as a *system* and a *process* that belongs to local communities (Ripp, 2018). But at the same time – because of its highly relevant role for these communities – it's heavily affected by unplanned urban change (urban transformation).

Conservation principles and praxes have also been changed according to these new challenges from a supply-driven conservation praxis, with focus on protection, via conservation and restoration in focus, to a demand-driven conservation praxis, with focus on adaptive re-use and spill-over effects in connection with sustainable development, social inclusion, urban transformation and regional growth (Gustafsson, 2019). This broaden perspective has often implied a change of objectives from protection to pro-action, and that cultural heritage advocators have need to leave their comfort zone and

[1] Organisation of World Heritage Cities, Regensburg
e-mail: matthiasripp@posteo.de
[2] Department of Art History, Uppsala University
christer.gustafsson@konstvet.uu.se

enter the trading zone to be part of a bigger context and to be able to find new ways of opportunities to negotiate with policy- and decision-makers as well as other stakeholders (Sörlin, 2001; Muñoz Viñas, 2005; Gustafsson, 2009).

The purpose of this book is not to describe damage or deterioration of the physical heritage. This has been examined already in different projects and publications (Sesana et al., 2021). Instead, we shall focus on how these changes are affecting the cultural heritage-system and what this means for the people – be it local communities, other users like tourists or visitors and also decision makers. Similar issues between the heritage sector and urban transformation and urban development as mentioned above have been described by Gustafsson (2009), who suggests such challenges and conflicts can be overcome if stakeholders and decision-makers first enter a "trading zone" of discussion and negotiation, from which all parties ultimately benefit. Many challenges and conflicts have the potential to contradict the original objective of preservation doctrines like for example the Venice Charter or the World Heritage Convention, even if sometimes in an indirect way.

Urban transformation can be rooted in many different causes, Hölscher and Frantzeskaki (2021) outline three perspectives: *in, of* and *by* cities as a structuring approach for integrated knowledge about the subject. However, the objective of this book is to focus on the climate crisis. Indirect effects are also of interest, for example results of changes in weather patterns, extreme heat, drought, heavy rainfall, flooding, but also limitations of accessibility for example through climate-change-prevention measures like the ban of conventional fueled cars and heating systems, etc. Other topics of interest could be e.g., urban heritage in relation to the UN SDGs, the New Urban Agenda, the Green Deal as well as the New European Bauhaus; adaptive reuse of historic urban landscape; and circular business models for conservation projects. The effects of various processes of urban transformation have been analysed and described, for example, in McCormick's "Advancing Sustainable Urban Transformation", which serves as an analytical lens to describe and understand the continuous, complex and contested processes and dynamics in cities (McCormick et al., 2013).

2. Context

The global society is today facing many pressing issues besides climate change; ageing population, threatened democracy, unsafe use of AI, and wars. Just to mention a few important ones: poverty, food insecurity, refugee rights, pandemics, healthcare, disability rights, LGBTQ+ rights, reproductive justice, children's rights, gender equality, cybersecurity, disinformation, freedom of the press, debt crises, corruption, authoritarianism, and global cooperation. In 2015, the world leaders agreed upon 17 global goals, the United Nations Sustainable Development Goals, Agenda 2030, in order to fight the challenges (United Nations, 2015).

In 2016, the New Urban Agenda was adopted at the United Nations Conference on Housing and Sustainable Urban Development (Habitat III) in Quito, Ecuador (United Nations, 2017). It was the first internationally agreed document detailing implementation of the urban dimension of the SDGs. The New Urban Agenda highlights linkages between sustainable urbanisation and job creation, livelihood opportunities and improved quality of life, and it insists on incorporation of all these sectors in every urban development or renewal policy and strategy.

To overcome climate change and environmental degradation as an existential threat to Europe and the world, the European Commission has adopted the European Green Deal with the aim to transform the EU into a modern, resource-efficient and competitive economy (European Commission, 2019). The Green Deal ensures no net emissions of greenhouse gases by 2050, economic growth decoupled from resource use and no place left behind. The ambition is that this will create new opportunities for innovation and investment and jobs, as well as reduce emissions, create jobs and growth, address energy poverty, reduce external energy dependency as well as improve health and wellbeing.

In order to connect the European Green Deal to living spaces and experiences, the European Commission has launched the New European Bauhaus. It is a creative and interdisciplinary initiative that calls to image and build a sustainable and inclusive future that is beautiful for people's eyes, minds, and souls. Beautiful are the places, practices, and experiences that are enriching, sustainable and inclusive. According to Europa Nostra, for the work with cultural heritage this could be an opportunity to take into

consideration the current shape and historic character of built environments as well as inspiring framework for social cohesion which contributes to the wellbeing of citizens and their communities. Furthermore, cultural heritage is a dynamic concept which defines to a large extent the future of living, cultural, social, and economic environments as well as each cultural heritage project entails a strong partnership between a wide range of actors and disciplines.

In recent times, the term circular economy has been used more and more frequently. It could be described as a model of production and consumption, which involves sharing, leasing, reusing, repairing, refurbishing and recycling existing materials and products as long as possible. Hereby, the life cycle of products is extended and furthermore, circular economy implies reducing waste to a minimum.

Many cities are shifting to a "circular paradigm" of production-consumption. The circular economy vision makes strong cases for business models centred on re-use, rather than consumption of ecological resources, and regenerative practices that have, on top of economic advantages, beneficial impacts for society as a whole (Ellen Macarthur foundation, 2015; Ellen MacArthur Foundation et al., 2015). The transition to a circular economy facilitates ecosystem conservation, regeneration, restoration and resilience in the face of new and emerging challenges (United Nations, 2015).

3. Our Understanding of "Urban" and why Urban becomes more important

The scope of this book is URBAN transformation related to cultural heritage. and we define Urban Heritage here as follows:

Urban Heritage

The term Urban Heritage is understood in different meanings, and often this understanding is still dominated by monuments and buildings, or what we may call tangible heritage. An easy definition of Urban Heritage would be cultural heritage in an urban setting. But as already shown, the understanding of cultural heritage is shifting currently and there is no general understanding of what "urban" is. Throughout this dissertation I will use the term "Urban Heritage" in the following way:

Urban Heritage is a system of tangible and intangible heritage, including dimensions of use and functions as well as communities and users. The ultimate purpose of Urban Heritage is to increase the quality of life of these communities and users.

*As urban I refer to the methodology that was used by the European Commission in their report on the state of European cities, where three categories (urban centre, urban cluster and rural) were introduced, based on urban density and measured by satellite data rather than numbers of inhabitants, which are difficult to count in countries with low levels of governmental structures. Following this more flexible and on the world-level easier to apply concept, heritage in dense urban centres and in (the surrounding) urban clusters is the topic of this book (*European Commission & UN Habitat, 2016, as cited in Ripp, 2022).

The still ongoing global trend to further urbanisation (Seto et al., 2013) results in the fact that more and more people are living in what can be conceived as an urban environment that is connected mostly to higher digress in density related, not only to infrastructure, population, and services, but also cultural heritage. The trend to the cities is - maybe after a small home-office-related dent in industrialised countries (Pileva and Markov, 2021) stronger than ever. Cities are struggling to provide basic needs, affordable housing and on the level of social sustainability with topics of integration, providing equal opportunities and of course desired "urban development" on different levels to name only a few. While focusing here on urban transformation we acknowledge of course that also in less dense environments climate-change related transformation is also happening and of course also affecting cultural heritage. In the scope of this book, we want to focus on urban settings for better comparability of the presented cases.

Figure 1: Additional Water Space integrated in the historic urban Landscape in Bordeaux, France (Matthias Ripp 2021)

4. Urban Transformation

Urban transformation can be understood as a set of planning methods and prerequisites which considerably change the features of the built environment by altering the urban arrangement of public spaces, purpose and shape of construction works, shape and size of building areas. Research in urban transformation has increased during the last decades, especially in relation to the three pillars of sustainable development focusing on partnership in cities with objectives to support more resilient and future-ready local economies. This can be noted in, for instance, the interest of World Economic Forum in supporting net zero and nature-positive cities, improving quality of life and growing local economies. The Davos *Baukultur* Alliance follows this and connects public and private sector stakeholders in a conscious, quality-oriented approach to planning, construction and management of buildings, infrastructure, public spaces and landscapes (Davos Declaration, 2018). For the relation between cultural heritage and urban transformation is the Davos Declaration of importance. It emphasises the value of culture in the built environments and expresses its idea for a high-quality *Baukultur*, underlining its benefits for society and the conditions to reach it.

The sustainable city of the future is usually visualised as smart, creative and disruptive, assuming that urban and local sustainability succeeds through new technology and innovation (Lillevold & Haarstad, 2019). On the other hand, if we agree upon that the built urban environments are vastly durable, we need to emphasise on how assets brought from the past – histories, artefacts and places – can be used in adaptive manners for promoting urban sustainability.

UNESCO presented in Historic Urban Landscape an approach to manage urban transformation in a holistic way by integrating the ambitions of urban heritage conservation with those of social and economic development (UNESCO, 2011). Hereby, urban heritage can be understood as a social, cultural and economic asset for the development of cities. That opened up for heritage advocators to not just focus on preservation and conservation of built heritage but to focus on the complete human environment with all of its tangible and intangible qualities. This was an important step to increase the sustainability of planning and design interventions by taking into account the existing built environment, intangible heritage, cultural diversity, socio-economic and environmental factors along with local community values.

Urban transformation is highlighted in the United Nations Sustainable Development Goals, Agenda 2030, in goal 11 Sustainable cities and communities. In target 11.4 cultural heritage is mentioned for the very first time in such international high-level policy documents. Jyoti Hosagrahar, Jeffrey Soule, Luigi Fusco Girard, and Andrew Potts (2016) discuss in a paper certain integration of culture and cultural heritage into urban development plans and policies as a way to enrich sustainability of urban areas through cultural heritage. According to them, culture and cultural heritage play a critical role in the achievement of this new paradigm of a sustainable city. They recognize several contemporary issues in urban heritage conservation: unprecedented and incessant urbanisation, globalisation and loss of identity, excessive and insensitive tourism, climate change related disasters, significant demographic changes with migrant and refugee population, inadequate urban planning, ecological perspectives on urban settlements, and human rights-based approaches to cultural and natural heritage processes and outcomes. Urban transformation that integrates cultural heritage is more sustainable, more diverse, and more inclusive. The authors stress cultural heritage and creativity as a driver for inclusive economic development, as an enabler for social cohesion, inclusion and equity as well as that cultural

heritage and historic quarters of cities can improve liveability and sustainability of urban areas.

It is positive that cultural heritage is mentioned in connection to urban transformation in Agenda 2030 target 11.4. However, the original indicator for measuring the progress and to determine whether it had been achieved or can be regarded as too vague. "UN-designated Indicator 11.4.1 (Tier III): Total expenditure (type of heritage (cultural, natural, mixed, World Heritage Centre designation), level of government (national, regional, and local/municipal), type of expenditure (operating expenditure/investment) and type of private funding (donations in kind, private non-profit sector, sponsorship and private) per capita spent on the preservation, protection and conservation of all cultural and natural heritage". This can be considered as a double fault: it is impossible to draw conclusions about how much the cultural heritage turns over if you only consider public sector budgets - the majority of, for example, building maintenance is carried out by private construction companies for private property owners. Furthermore, cultural heritage should not be seen as a cost to society - instead it is a significant investment.

UNESCO's thematic indicators for culture in the 2030 Agenda are responding to the "5 Ps": People, Planet, Prosperity, Peace, and Partnerships with the objective to make culture's contribution to sustainable development more visible. The 22 new indicators are grouped into 4 thematic dimensions (Environment & Resilience, Prosperity & Livelihoods, Knowledge & Skills, and Inclusion & Participation) that correspond to the 3 pillars of sustainable development plus a fourth dimension related to education, knowledge and skills. (UNESCO, 2019).

5. Cultural heritage as a system

As cultural values and perspectives evolve, so does the concept of cultural heritage. Today, cultural heritage is viewed more broadly than in previous generations, and there is increased urgency to protect and safeguard it for future generations. In urban planning, the traditional approach to preserving historic areas focused solely on physical structures, treating them as relics with value separate from their context and everyday use. (Siravo, 2014: 161) This approach stemmed from a materialistic view of heritage as a discipline solely concerned with the physical appearance and conditions of monuments,

solely overseen by conservators. This viewpoint has been given the name "authorised heritage discourse" by Laurajane Smith (2006).

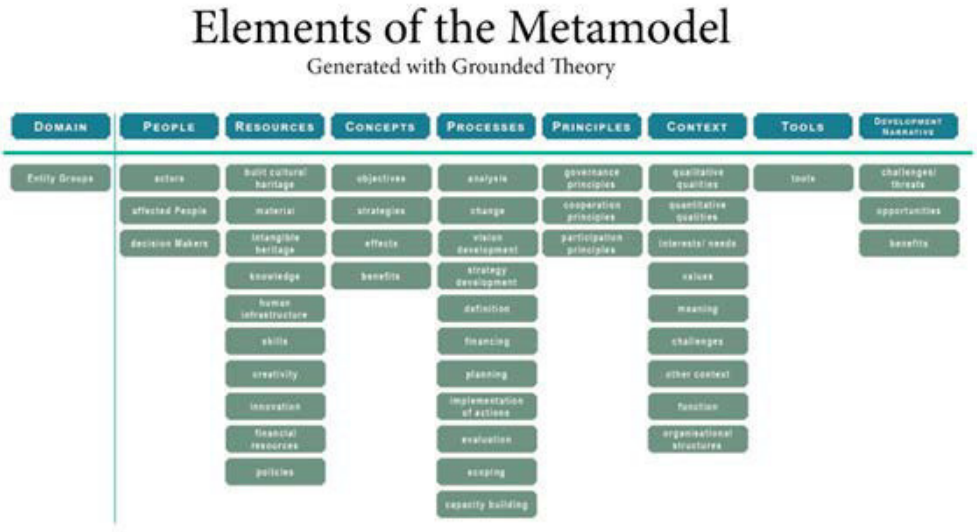
The perception of cultural heritage as primarily physical and material remains prevalent worldwide, with a particularly strong foothold in Europe. This view is reflected in the traditional approach to identifying and designating cultural and natural heritage as properties, as enshrined in the 1972 UNESCO Convention on the Protection of Cultural and Natural Heritage (the World Heritage Convention). Article 1 of the Convention defines "cultural heritage" as consisting of monuments, groups of buildings, and sites. However, the 1964 Venice Charter, which served as a founding document for the International Council on Monuments and Sites (ICOMOS) and was adopted in 1965, made references to the "setting" and "socially useful purpose" (ICOMOS, 1964) of the cultural heritage, hinting at the rejection of a broader definition. The 1972 Convention built on this idea, with Article 5(a) expressing a desire to "integrate the protection of [cultural and natural heritage] into comprehensive planning programs" and give it a function in the community's life. It has been only recently that a fuller understanding of the dependent relationship between cultural heritage (tangible and intangible) and communities has emerged.

The 2005 adoption of the Framework Convention on the Value of Cultural Heritage for Society (the Faro Convention - Council of Europe, 2005) marked a significant shift in this direction. Article 1c of the Convention explicitly states that "the conservation of cultural heritage and its sustainable use have human development and quality of life as their goal". The Faro Convention emphasises the need to place people and human values at the core of a broader and cross-disciplinary concept of cultural heritage and involve everyone in defining and managing it, in recognition of a constantly evolving society. The 2005 Convention (UNESCO, 2005) framed by UNESCO further recognized "the fundamental role of civil society" and this issue was later incorporated into the Operational Guidelines for the Implementation of the World Heritage Convention, although only as a retrospective measure.

Modern understanding of cultural heritage is more dynamic and flexible, encompassing a holistic perspective that views heritage as "a social and political construct encompassing all those places, artefacts and cultural expressions inherited from the past which, because they are seen to reflect and validate our identity as nations, communities, families and even individuals, are

worthy of some form of respect and protection" (Labadi and Logan, 2015: xiii). This view recognizes the diversity of entities encompassed by the term "heritage," with a growing emphasis on the role of communities and their use of heritage over time (Kalman, 2014).

The evolution in the perception of cultural heritage has significant implications for the COMUS Project (Ripp and Stein, 2018), particularly in terms of the role and integration of communities and stakeholders in heritage-based urban development. The project places a strong emphasis on adopting new and innovative approaches and techniques for the coordination and integration of stakeholders, leveraging the benefits of community participation in developing a sustainable future for local communities. These strategies are at the core of the COMUS methodology and are aimed at generating long-term benefits for local communities, improving quality of life and economic development. Several other urban heritage networks, including e.g. the Organisation of World Heritage Cities, also recognize the importance of stakeholder integration and community participation in heritage-based urban development (Göttler and Ripp, 2017, Ripp and Rodwell, 2018). The development of the COMUS methodology is founded on the principle of incorporating complex, systemic processes in contemporary management and communication, enabling exploration of different approaches and techniques to address the challenges in preserving our cultural heritage while ensuring sustainable development in urban areas.



6. Impacts of climate change and urban transformation in and on the system

If we understand cultural heritage as a system, the impacts of the meta-challenge climate change and related urban transformation are related to different entities of the system:

6.1 People

People are affected on different levels by climate change and related urban transformation. Most obvious for this are impacts on *health,* for instance by the rising number of extremely hot days, floods, heavy rain, drought (Trenberth, 2005) or other direct impacts. Also, the wealth of people can be affected by damage or shrinking or rising property value related to the habitability of certain areas (Brevik, 2013). Migration, gentrification and segregation are other processes that can be triggered by climate change and will accelerate urban transformation, as can poverty, hunger, water scarcity, etc. (Keenanet et al., 2018).

Besides "affected People" also the local, regional and national decision makers need to prepare and respond to these impacts. The emergency mode and the preparation for crises are gaining larger parts in urban acting in many regions of the world.

6.2 Resources (Built heritage, material, Intangible, knowledge, human infrastructure, skills, creativity, innovation, financial resources, policies)

Resources, which are part of the heritage system, are at the same time affected but also have seen changes in their role. For example, buildings as part of built heritage are affected by extreme heat, severe weather, heavy rain, flooding, etc, but at the same time see increased pressure to be part of renewable energy production for Example through the installation of solar panels (Lucchi, 2023). Traditional materials are becoming sometimes low-tech start-ups in adaptation (Idam and Kain, 2021-today), but at the same time are not always meeting the demands of modern norms (Eicke-Hennig, 2017). Connected with traditional materials but also traditional building techniques that can happen for example to cool hot temperatures are closely connected to knowledge that is unfortunately declining in many parts of the world. To put knowledge into practice human infrastructure and skills are necessary as well as creativity and innovation. The conflicts around the distribution of

public finances related to cultural heritage are also increasing especially in times of (economic) crisis and policies for urban planning, cultural heritage and climate change adaptation are reworked in most cities, and the balance between adaptation and safeguarding cultural heritage is rebalanced or questioned (Schmitt, 2013).

6.3 Concepts (Objectives, strategies, effects, benefits)

While for Example in Europe for the last 80 years the objectives in cultural heritage have been mainly dominated by the preservation and safeguarding narrative, today the pressing effects of climate change are increasingly demanding adaptation and change also in urban heritage settings. This pressure is shaped by new forms of mobility, renewable energy systems, the need to reduce energy consumption of heritage buildings, etc. In the public discussion this has left an impact on our vision of heritage that is more often perceived as an obstacle for adaptation. To rediscover the resilience qualities of cultural heritage can open new possibilities for adaptation (Ripp and Lukat, 2017). The effects and benefits of urban heritage related to climate change adaptation and urban transformation in general are not always obvious and need to be highlighted more often.

6.4 Processes (Analysis; change, vision development; strategy development, definition, financing, planning, implementation of actions, evaluation, scoping, capacity building)

Heritage as a system and process is made of a variety of different processes. All of them are relevant in connection to urban transformation and climate change: An ongoing analysis and evaluation of the - often rapidly changing - situation regarding not only external factors like climate and disasters but also urban transformation process is necessary to be able to respond adequately. This includes the development of strategies and vision, that today need to be rapid-response and long-term at the same time. Finances, planning tools and strategies need to be adapted accordingly and capacity building activities need to train the officers in charge to be able to respond and also see the impacts of climate change and urban transformation in the whole system (and not only specific silos). (Grafakos et al., 2019)

6.5 Principles (Governance principles, coperation principles, participation principles

Traditional principles on the urban level are often following long planning cycles. The increased speed of urban transformation calls for more flexible approaches in connection with long-term visions. Governance, Cooperation and participation principles need to be adapted accordingly. (Ripp and Daniel, 2023)

6.6 Context

Urban Heritage is at the same time context for other elements of its system and at the time part of a larger complex context (regional, national, financial markets, travel and tourisms, etc.) (Bandarin and Van Oers, 2012).

6.7 Tools

Tools for Example for urban interventions and public management are increasingly affected by digitalisation and the availability of more diversified and detailed data. This can help on one hand to get a more detailed picture of urban transformation and on the other hand to design new interventions like for example under the title SMART CITIES - is currently developed in many cities (Aelenei et al., 2016).

6.8 Development Narrative (Challenges/threats; opportunities, benefits)

The still prevalent development narrative (even in the UN SDGs) is more often questioned and viewed critically. In connection with more rapid climate-change related urban transformation more and more cities are changing their development paradigm for example through a quality of life or livability approach. (Gustafsson and Ripp, 2022)

7. Outlook

Adrianna Brechelke's chapter deals with the historical spatial-functional network system and Smart City strategy as an opportunity for the sustainable development of the Polish town Kolobrzeg. After World War II, Kolobrzeg was destroyed by approximately 90%. The following development led to an

urban-functional monoculture subordinated to tourism with ongoing reconstruction and regeneration efforts. The chapter discusses correlations between the historical urban network character and the spatial-functional balance as well as contemporary adaptation necessities, which will provide an opportunity not only for the development, but also for the preservation and adaptation of urban heritage objects in the face of the city's green transformation.

With the experience from the EU Horizon 2020 SHELTER project, and with aims to present these four governance typologies, *Louis J. Durrant, Jacques Teller, Atish N. Vadher,* and *Aitziber Egusquiza Ortega* discuss in their chapter challenges raised by the simultaneous urban adaptation to climate change and conservation of cultural heritage. In focus is how these challenges can be understood by various stakeholders and decision-makers entering a "trading zone". The authors present a refined version of the trading zone which allows stakeholders to identify more adaptive governance processes. In turn, this will provide a theoretical platform to facilitate the integration of cultural heritage sites into wider decision-making processes, enhancing the synergies between heritage and disaster-risk management experts.

Marika Fior and *Rosa Romano* ask the question: how does cultural heritage foster climate action? With urban design approaches and case studies from different climatic zones around the world, representing varied geographical contexts, their chapter investigates the rediscovery and re-evaluation of 'histo-cultural forms' of climate change adaptation. The authors outline techniques and solutions - from traditional and Indigenous knowledge to tangible historical features - that are being used to cope with heat islands, storms, floods, etc. and are genetically congenial to heritage sites.

The chapter of *Friedrich Idam* and *Günther Kain* deals with the enormous sustainability potential of built heritage. It describes how historical solution strategies for building conditioning can be recorded, evaluated and refined using the methods of applied building research. The authors present an alternative to the currently favored high-tech innovation of "smart buildings" and their technological consequences in the form of re-implementation of historically proven technologies which are more sustainable in the long term.

Xinghan Lou investigates the opportunities to use urban acupuncture as an intervention, to show cultural heritage confronting sustainability challeng-

es as urban development. In her chapter, she examines the possibility and pathways in which cultural heritage serves as an acupuncture spot to provide turning points in the trajectory of sustainable urban development. The author presents a new model of heritage practice via which a multidimensional perspective is arising to tackle urban development issues that cannot be addressed with established technical frameworks and mechanisms.

The adaptive reuse of industrial heritage is becoming increasingly important in the era of radical climate change-related urban transitions. *Asma Mehan* and *Jessica Stuckemeyer* studies impacts of climate change when preserving cultural heritage sites and buildings becomes a crucial aspect of sustainable and resilient urban development. Case studies from different parts of the world demonstrate the potential of adaptive reuse in preserving cultural heritage, promoting sustainability, and revitalising urban areas. This approach provides a model for sustainable urban development that balances the preservation of cultural heritage with the needs of communities and the environment.

Diana Farisah Rahman's chapter deals with the conflict between farmers and local communities in safeguarding their livelihood and ensuring the productivity of rice fields and the increasing tourism industry. The changes in livelihood and agricultural practices have transformed Balinese villages and communities, driven primarily by the climate crisis rather than tourism. The chapter explores the role of Balinese culture in climate change adaptation as well as examine the impact of the climate crisis on Balinese cultural heritage, including traditional knowledge, livelihoods, and urban landscape, as well as seeks to explore the potential of local and indigenous knowledge as a bridge for integrating climate actions and heritage preservation.

Bhagyasshree Ramakrishna and *Shruthi Ramesh* chapter opens up for a discussion about negotiations of cultural markers along Mumbai's expanding Metropolitan coast. Mumbai's geographical terrain has been historically reshaped and defined by its several rulers and colonising forces, shaping new cultural morphologies with the island's spatial territoriality. The colonial practice of land-reclamations has continued into independent India to reinstate new coastal-edge meanings. The chapter argues that Mumbai's kinetic urban development juxtaposed over its rich, historic, socio-cultural landmarks poses contentions of climate change and there is a need of forging a more symbiotic relationship.

Carlo Francini and *Gaia Vannucci* present a study on the impact of the photovoltaic system on roofs in the Historic Centre of Florence World Heritage site and the collaboration and balance between innovation, authenticity and integrity. The Florence experience serves as example of how studies and researches on the territory, additional levels of safeguard and international recommendations/conventions can be transposed in local legislation but also come into conflict with it. According to the authors, climate change turns out to be an ambivalent threat: for itself and for those measures that risk contradicting the objective of maintaining the integrity and authenticity of the site.

Yijin Zhang studies heritage conservation when facing new challenges of urban development triggered by air governance in "West Lake Cultural Landscape" and the City of Hangzhou. As air governance has achieved positive results, atmospheric visibility has increased and the range of sight has expanded. The chapter establishes the "Visibility Changes-Urban Development-Heritage Protection" linkage system, and discusses how the positive effects of air governance affect or even break the original balance between the city and the heritage, reflecting the limitations of the current heritage management system. Based on this, the research proposes strategies to make the overall management model more systematic, forward-thinking, precise, and intelligent, as well as to optimise the multi-party dialogue platform for stakeholders — Heritage Impact Assessment.

Based on a six-year case study of the City of Edgerton, Wisconsin, USA, *Sarah E. Braun* has studied climate change related to urban transformation and the role of cultural heritage with a particular focus on the power of local government policy for building resilient cities and communities. The study demonstrates successes and challenges that are all relevant to urban transformation and for local communities.

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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.