Introduction

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1 Healthier and Resilient Cities: Green Urbanism and Other Solutions

More than 55% of the world population already live in urbanized areas, and this percentage is expected to rise in the coming years and decades in the wake of the consolidated trend of the last century (United Nations, Department of Economic and Social Affairs, Population Division (2022). World Population Prospects 2022: Ten Key Messages.). Urban settlements are a clear demonstration of the humans' impact on the environment, but, while being significant contributor to climate change (Mi et al., 2019), cities are particularly vulnerable to extreme weather events and other consequences of the changing climate (Hunt & Watkiss, 2011; Zhao et al., 2018). In this view, citizens are exposed to environmental boundaries that could negatively impact on their health status generating risks for individuals according to their specific vulnerabilities (Chan et al., 2019; Song et al., 2020). There is urgency of adapting the built environment to the main effects of climate change already experienced (Yang et al., 2021), such as the always more frequent and intense occurrences of heat waves or extreme precipitation patterns causing floods (Guerreiro et al., 2018). At the same time, there is the need to improve cities liveability by limiting pollution associated with anthropogenic activities (Crippa et al., 2021).

The challenge of counteracting the urban environmental quality detriment due to climate change and natural resources depletion must be tackled accounting for both adaptation and mitigation strategies. These need to be carefully implemented by limiting conflicts or trade-offs while enhancing potential synergies (Garafakos et al., 2019). Here rises the relevance of tools availability for quantifying the foreseen effects of any urban plans or intervention in terms of reducing health risks potential associated with different level of population vulnerabilities, always in the framework of climate change. In order to reach this goal, it is fundamental to better understand the impact of possible strategies at different levels and scales. Researchers have the role of providing evidence about potential benefits achievable thanks to novel technological or even nature-based solutions so to promote virtuous practices among local authorities, practitioners, and communities.

This book collects experiences about cities and the built environment in general, worldwide and their impacts on both natural resources and human health that are strictly correlated. All the contributions are framed in the climate change context providing different perspectives on how to cope with occurring changes in order to make cities more resilient and liveable, even in critical circumstances such as the recent COVID-19 pandemic, and proposing solutions at different scales, from single building up to urban planning passing by outdoor public areas design.

The overall book content is thus structured into two parts: the first one focuses on the relation between cities and citizens, accounting for health implications of overheating and pollutants exposure of population characterized by different vulnerabilities, and looking for opportunities and inspirations coming from both nature and cultural heritage; the second part of the book focuses on urban planning for a greener and more sustainable future; here different models are proposed for different contexts always underlining the importance of locally declining the sustainability concept which undertakes the three pillars of economic vitality, social equity, and environmental protection (Purvis et al., 2019).

More specifically, the first part is entitled "Health and Environmental Resilience and Liveability in Cities" and is made by eight chapters. Chapters from 2 to 4 are associated

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by the theme of solid waste management (SWM) to be urgently tackled (especially in developing countries) to ensure healthy urban areas. Chapter 2 focuses on the case study of the Philippines where community participation in solid waste segregation, the process at the base of a proper SWM, was explored through surveys submitted to 100 households in a specific municipality of the country. Study results reveal the needed conditions for the active participation of local community which could be summarized into a clear alignment among regulations at different levels to be properly communicated to foster social innovation. Chapter 3 focuses on the relevance of a specific stakeholder into the SWM process: waste pickers. According to the authors, waste pickers are not properly framed into official waste management system, while their contribution demonstrated to be effective, cheaper, and sustainable. Finally, Chap. 4 combines the analysis of the solid waste issue in Nigeria to the high health risks associated with air pollution in the country. Air pollution is highly dependent on inefficient cooking systems mostly relying on biomass, while available engineering solutions for waste to energy could generate opportunities in the national energy transition, simultaneously tackling both waste management and air pollution issues. Therefore, Chaps. 5 and 6 provide solutions to increase liveability at building level taking inspiration directly from natural systems (Chap. 5) and heritage buildings (Chap. 6), while Chap. 7 proposes a method to quantify rising overheating risks in indoors through the definition of an "overheating signature". More specifically, Chap. 5 presents the design concept of multi-regulation biomimetic envelope both in theory and through an explanatory case study. Mimicking natural systems that have adapted over centuries to specific environmental conditions would allow to achieve a positive environmental impact of the built environment, according to authors, and such impact could be amplified by considering more than one natural regulation system at a time. On the other hand, Chap. 6 compares the performance of modern and heritage buildings in providing healthy conditions for people during the COVID-19 pandemic and related lockdown periods. The study in based in Egypt and highlights design strategies and features that positively affect the heritage building performance (high visual and indoor air quality, in particular) to be potentially included in future buildings design. Finally, Chap. 7 avoids focusing on buildings envelope characteristics to indeed provide a data-driven model for predicting indoor overheating risks according to internal temperature, external conditions, and occupants' behaviours. Presented application demonstrates that data-driven methods could be a valid alternative to time-consuming dynamic thermal simulations in predicting overheating risks in the climate change framework. The last two chapters of book part I analyse resiliency and liveability of the built environment by focusing on outdoors but through two different perspectives and scopes. Chapter 8 explores requirements for open public areas in order to be a safe place for children, including the autistic ones. These are particularly vulnerable groups which therefore need specific measures in space design that are generally addressed in the private sphere while are still not considered in public areas. The lack of such spaces increases their vulnerability. Concluding, Chap. 9 presents the relevance of green infrastructures for the sustainable development of cities fostering ecosystem services, increasing resiliency, and reducing local poverty. Landscape assessment via both cartography and visual inspection was thus used as a tool for critically analysing a specific region in Mexico to guide future urban plans on the need of green corridors.

The topic of Chap. 9 opens the door to the main theme of book part II entitled "Principles of Green Urbanism and the Transformation to a Greener Sustainable Environment". As the previous, also part II is made by eight chapters. Chapters 10 and 11 take a look to the relation between local communities and public green areas. More specifically, Chap. 10 discusses "greenification" of dense neighbourhood through the design of pocked parks. These are envisaged into areas that are still without buildings into dense urban environments like the capital of Albania, Tirana, that is the presented case study. The authors emphasize the relevance of urban pocket parks for improving community interaction and promoting healthy habits such as walking or cycling. On the other hand, Chap. 11 highlights the local dimension of sustainability due to spatial, ecological, and cultural specifics of each community. Therefore, the research focuses on green markets as examples of urban identity where citizens interact, exchange, and experience diversity. Given these characteristics, green markets are presented as potentially sustainable public spaces, and such hypothesis was tested in the two largest cities of Croatia (Zagreb and Split) through a quantitative research methodology. Chapters from 12 to 14 present the common topic of sustainable urban planning in four different contexts and under different emergencies and constrains. Chapter 12 describes the planning constrains related to the Vesuvian National Park (Italy) which is globally recognized for its environmental and landscape value. Here the challenge is to combine nature conservation and local development instances. The study points out fragilities and vulnerabilities of the area concluding that environmentally sustainable actions plan must address conservation of natural resources by relocating production activities and mitigating risks. Chapter 13 presents the urban development of Amman, Jordan, as the results of a lack in planning policies that did not consider refugees crisis which strongly characterize the area. Informal settlements have become part of the city, and research findings aim at supporting effective future planning policies to improve the quality of the

urban environment. Chapter 14 moves from a different crisis, the recent COVID-19 pandemic, to justify the renovate interest in the garden-city model of Howards, specifically referring to the context of Istanbul. Indeed, the garden-city model would provide healthy houses in green areas that was recognized as a plus during the pandemic and related lockdowns. How to quantify the sustainability of all these approaches to urban planning is the topic of Chap. 15. The authors of this contribution analyse the carbon footprint calculator for urban planning, a tool that was specifically developed thanks to funds from the Community of Madrid. The carbon footprint is pursued by taking into account uses and activities foreseen in future planning and the associated greenhouse gas emissions as well as changes in land use and coverage affecting soil sink capabilities. This tool has the potential of leading local authorities for the selection of the lowest carbon emissions alternative and thus for improving the overall resiliency and mitigation capability of a city. Finally, Chaps. 16 and 17 apply greening principles at building scale. More specifically, Chap. 16 deals with potential benefits achievable through the application of green roofs on buildings of the communist period in Tirana. A costs–benefits analysis was carried out. Despite green roofs are still more expensive considering the installation costs, benefits, including the reduction of CO_2 in atmosphere, the management of rainwater runoff, the reduction of noise pollution and urban heat island phenomenon, and the positive contribution to urban ecosystem, overcome costs on the long-term so that green roofs are proved to be the most cost-effective solution. Finally, Chap. 17 brings the concept of "design with nature" to present atrium with evaporative cooling as potential solution to improve liveability of Mediterranean areas. The study focused on the context of Alexandria (Egypt) and was based on CFD analysis of different configurations of the proposed solution. The analysed configuration results to be more effective in tall residential buildings increasing the effectiveness of natural-stack ventilation.

All the chapters are related to each other following the red line of the seek for more liveable cities in the framework of climate change leading to all the consequences here discussed. All the chapters contributed to the book content and the related relevant takeaways that could support scientific communities and practitioners towards the achievement of resilient and healthy cities. More specifically, takeaways could be summarized in the following: (i) the importance of addressing multiple dimensions of urban environmental quality to avoid trade-offs of implemented solutions; (ii) the need for understanding principles of human comfort and well-being in the urban areas, addressing multiple scales of analysis, to provide scalable solutions but, at the same time, the awareness that global problems always require local solutions.

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