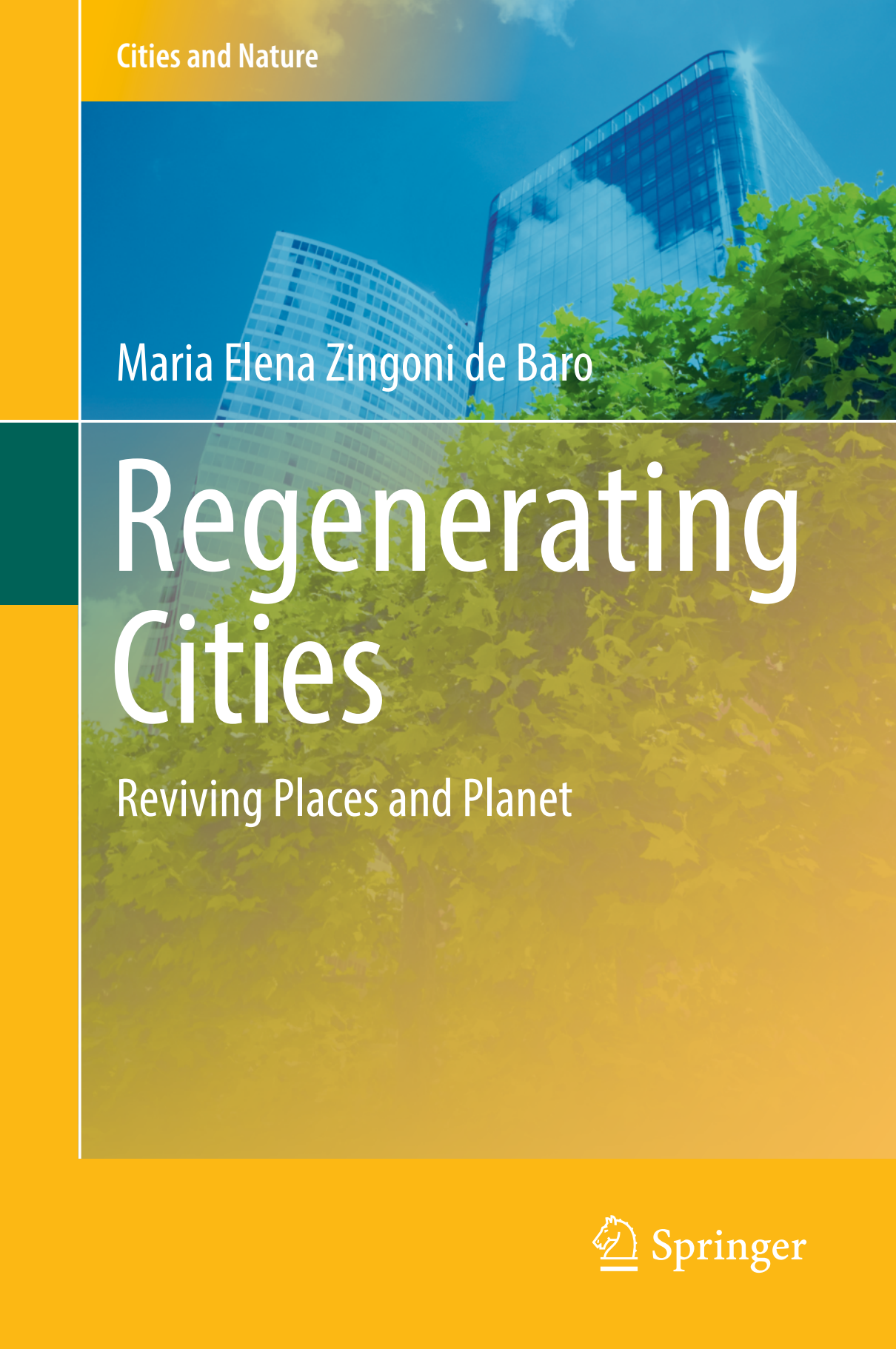
Cities and Nature
Maria Elena Zingoni de Baro
Regenerating Cities
Reviving Places and Planet
Springer

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Maria Elena Zingoni de Baro

# Regenerating Cities

## Reviving Places and Planet

Springer

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ISSN 2520-8306 ISSN 2520-8314 (electronic)
Cities and Nature
ISBN 978-3-030-90558-3 ISBN 978-3-030-90559-0 (eBook)
https://doi.org/10.1007/978-3-030-90559-0



This Springer imprint is published by the registered company Springer Nature Switzerland AG
The registered company address is: Gewerbestrasse 11, 6330 Cham, Switzerland

*To my grandchildren and the younger generations that are claiming urgent measures to ensure their right to a liveable, safe and healthy future.*

# Foreword

## Regenerating Cities?

I was imagining some of the reactions upon reading the title of this book...

Regenerating cities has to be nonsense surely! Cities are the problem, aren't they?

For years cities have been consuming all the natural resources and polluting all the waterways, just so human beings can show how superior they are. Sure there have been a few examples here and there that are making their politicians get re-elected. But get real. Regenerating cities?

Every now and then when I hear such words I feel as though they may have a good point. Is there any chance we could actually be regenerating cities?

When I read through Mariela's deep and yet practical approach to regenerating cities, I was very persuaded. I shouldn't need to be as I helped Mariela do her Ph.D. on this topic and have written about it myself. But this is very persuasive. And it's beautifully presented.

Get yourself a dose of hope in how we can get on with regenerating cities. It's the next big agenda.

Peter Newman, AO
Professor of Sustainability
Curtin University
Perth, WA, Australia

# Preface

The third decade of the 21st century has started shaking the planet and humanity with some foreseen catastrophes by Earth scientists but not considered by many politicians nor by influential parts of the corporate and financial sector. Thus, the world is living a triple emergency, environmental, climate and public health crisis. The consequences are sensed in the ongoing lives of most of humanity. The Covid19 pandemic has recently been declared endemic, meaning we will have to adapt to live with the virus and will see even more deaths. There is extensive scientific evidence that the triple emergency is a consequence of the overwhelming destruction of the natural world.

A paradigm shift is overdue.

To address these issues, significant shifts are necessary, shifts that include qualitative and subjective aspects as well as the aspiration of living according to personal and collective values that entail an understanding of the planet's boundaries and respect for the world as a complex living system, including all forms of life. As Wahl (2016) posits, that change starts by asking deep, meaningful questions, such as "why" and "what if" questions and then, give place to new active questions that will follow on how to proceed and take action. To address and facilitate the pathways to the shift, we also need to challenge the current way we think about, design and produce our cities that, consequently, affect their ecological footprint.

Cities are becoming the main characters in the modern world. However, as such, what quality of life are they offering to their ever-increasing urban populations and at what cost to the natural systems that sustain human and non-human life on the planet?

This book is about envisioning opportunities and capabilities for cities to contribute to a nature-based society and economy because as human constructs, cities have a huge debt with nature. If as citizens and design professionals we are to address some of the challenges that the environment, climate and human health emergency is posing to cities and communities, we need to be aware that a different way of living and working is due. Nature has the power to regenerate, but the prevailing economic model does not respect nature's pace to do it.

This book proposes to consider regenerative sustainable urbanism, an alternative integrated approach to urban design and planning, founded within the regenerative sustainability paradigm, that combines shared principles of regenerative development and biophilic urbanism. It aims to contribute to the design and planning of future and existing cities, promoting transformative change from buildings to the regional context.

This research has developed this design approach as a promising perspective to regenerate cities, enabling them to be part of the solution to the challenges of the modern world. I acknowledge that this is a vast process involving many significant shifts in current thinking and behaviours and it will take time to become mainstream. Nevertheless, the results achieved in both case studies -Curitiba and Singapore- seem to provide promising outcomes. Perhaps, it is not common to have the opportunity to transform a whole city, unless visionary leaders and opportunities are present, as was the case in those two cities. But it would be more prone if empowered communities assume the task. There are emerging cases of smaller scale developments, such as neighbourhoods and urban precincts that seem to be on their pathway toward regenerative sustainability, which is driven by community leaders, as some examples of placemaking are demonstrating.

The process of making this book was my own regenerative journey as well, opening my mind to a broad field of possibilities. The aim is to share and expand this knowledge with the design and planning community, decision-makers, students and people interested in the topic, to further develop the ideas and apply them in future opportunities, seeking to make positive contributions to build a culture of regeneration, addressing some of the current challenges and help to respond to the claims of the young generations to ensure their right for a safe and liveable future.

Perth, Australia — Maria Elena Zingoni de Baro
August 2021

# Contents

# Abbreviations

| | |
|---|---|
| AFD | Agence Française de Développement |
| CLC | Centre for Liveable Cities |
| CMC | Câmara Municipal de Curitiba |
| CUSP | Curtin University Sustainability Policy Institute |
| HDB | Housing Development Board (Singapore) |
| IBGE | Instituto Brasileiro de Geografia e Estatística |
| ICLEI | International Council for Local Environmental Initiatives |
| ICLEI-CBC | International Council for Local Environmental Initiatives—Cities Biodiversity Center |
| ILFI | International Living Future Institute |
| IPCC | Intergovernmental Panel for Climate Change |
| IPPUC | Portuguese acronym for Research and Urban Planning Institute of Curitiba |
| MEA | Millennium Ecosystem Assessment |
| NParks | National Parks Board (Singapore) |
| PIA | Planning Institute of Australia |
| PMC | Prefeitura Municipal de Curitiba |
| PUB | Public Utilities Board (Singapore) |
| SDGs | Sustainable Development Goals |
| SDSN | Sustainable Development Solutions Network |
| STS | Science and Technological Studies |
| UN DESA | United Nations Department of Economics and Social Affairs |
| UNEP | United Nations Environment Programme |
| UNESCO | The United Nations Educational, Scientific and Cultural Organisation |
| URA | Urban Redevelopment Authority (Singapore) |
| WEF | World Economic Forum |
| WFC | World Future Council |
| WHO | World Health Organisation |
| WUP | World Urbanisation Prospects |

# Chapter 1
# Introduction


**Abstract** This chapter frames the book's aim, context and structure. Cities are wonderful human inventions, cradles for social interactions that enable the production of knowledge and innovation, culture, work and leisure. However, they have been growing for centuries based on cumulative ecological footprints and degradation of natural and social systems. As the world is becoming increasingly urbanised, cities should be enabled to contribute solutions to repair and rebuild past damage, endeavouring a nature-positive world. But how to transform cities into places that put human and non-human life at the forefront? This book suggests that integrating social-ecological design approaches into planning strategies can lead to regenerative processes in cities. It develops the concept of Regenerative Sustainable Urbanism as a foundational and practice-oriented concept for the future of cities, setting out how the approach could make cities for people and nature together, transforming the polarity of impacts by turning negative ones into net-positive outcomes. This is demonstrated in two case studies, Curitiba and Singapore, two cities that have pioneered transformative change. The regeneration of cities is about a transition towards regenerative sustainability, meaning urban socio-ecological regeneration by restoring and helping rebuild past impacts, ensuring ecosystem services, health and wellbeing of all living systems. This can help not only increase resilience and mitigate the effects of climate change; instead, it integrates within a holistic approach the benefits of biophilic urbanism and regenerative development, allowing cities to be part of the bioregional solution rather than a barrier, contributing to the common good that appears to be the construction of a culture of regeneration, starting locally and then globally.

**Keywords** Transformative change · Nature-positive world · Regenerative sustainability · Social-ecological approaches · Biophilic urbanism · Regenerative development



M. E. Zingoni de Baro, *Regenerating Cities*, Cities and Nature,
https://doi.org/10.1007/978-3-030-90559-0_1

## 1.1 Background to Regenerative Sustainability and a Nature-Positive World

Humanity and the planet entered the second millennium displaying the imminence of a turning point. Foreseen natural disasters are more frequent and intense, upsurge in poverty and inequality leads to social unrest and unexpected shocks in public health and economies are intensified. Since 2018, the world is seeing increasing protests led by the younger generations claiming urgent measures to ensure their right to a safe and liveable future. In November 2019, governments of many countries, scientists and professionals across the world declared the Climate Emergency and the Extinction Rebellion, revealing the critical situation that provoked the global Climate and Environment Emergency. Shortly after these declarations, the Covid 19 pandemic was proclaimed by the World Health Organisation (WHO) in March 2020, adding a third component to the global emergency. We are now living a triple climate, environment and public health global emergency demonstrating that a paradigm change is overdue. There is scientific evidence that this triple emergency is a consequence of the impact of exacerbated human activity on the natural world. This situation strongly hit and continues to affect public health and economies globally, revealing the value of nature in urban and bioregional environments. The World Economic Forum has released an important series of reports to guide the rest of the post-pandemic recovery founded on the vision of a nature-positive economy (WEF 2020a, b, c).

The goal of this book is to envision opportunities and capabilities for cities to contribute to a nature-based society and economy because as human constructs, they have a debt with nature. Cities have a leading role to play in this new paradigm that highlights the value of nature in supporting life on the planet, including human life. Cities are handling three-quarters of economic activity and are home to more than half of the world population. In 2020, 56.2% of world population was residing in urban areas and predictions estimate that this Figure will attain 68% by 2050 (Satterthwaite 2020; UN DESA 2018). Urban centres are claimed responsible for many of the current challenges. They produce the most carbon emissions because it is in them that most of the fossil fuels are burnt, mainly in transportation, reflecting a high negative carbon footprint (Newman and Jennings 2008). Besides the huge consumption of fossil fuels, metals and concrete, urban populations also consume nearly half of nature's annual photosynthetic capacity displaying an ecological footprint in affluent countries sometimes 1000 times bigger than the proper urban area (Satterthwaite and Dodman 2020; Girardet 2010, 2015).

Though, cities are centres of opportunity and can eventually act as a force enabling the world to overcome some of the present and future challenges. In The Urban Opportunity report, the Thematic Group on Sustainable Development (SDSN 2013) argue that cities have "characteristics that make them particularly effective as platforms for transformative and sustainable development:

1. Cities concentrate and can accelerate economic activity,
2. Urban infrastructure investment can enable growth, employment and poverty reduction,

3. Urban areas are sites for social transformation,
4. Local governments are nimble,
5. Cities are sites of innovation,
6. Cities are interconnected with rural areas,
7. Cities are interconnected with natural environment,
8. Cities have the potential to minimise environmental footprint and
9. Cities are suited for systems-based approaches".

(SDSN 2013, p. 9–12).

Considering this significant urban potential, reintegrating nature into built environments can be an essential step forward towards a nature-positive world. This book focuses on the capability of and opportunity for cities to contribute to a nature-based economy (WEF 2020a, b) and society. It is suggested that the integration of social-ecological approaches to urban design and planning can be a valuable contribution. Biophilic urbanism and regenerative development are social-ecological approaches deemed to contribute knowledge, principles and tools to facilitate the recoupling of humans and nature (Zingoni de Baro 2015, 2020). Restoring and regenerating nature within built environments facilitate transformative change. This is vital not only for improving biodiversity but for ensuring health and quality of life that rely on the benefits that nature provides. To be part of the solution, cities need to be thought about, designed and built in a way that facilitates and sustain the progressive partnership with nature.

The following sections overview the causes of the current situation of the built environment.

### *1.1.1 The Urban Issue and the Challenges of the Anthropocene*

Historically, cities have been destinations for migrants seeking opportunities for better quality of life and the trend has intensified in current times, making them progressively congested and more complex (Sassen 2009). For centuries, urban growth has increased its ecological footprint and consequently, the degradation of natural ecosystems, as the basis of its wealth and social opportunities. This fact reflects the overwhelming impact of human activities on earth's ecosystems that defines a new era, the Anthropocene, described by Crutzen and Stoermer (2000). This impact has produced destructive effects on the planet, as is the case of human-induced climate change.

In this scenario, many questions arise about pathways toward improved living conditions for humanity and non-human living systems while preserving a safe operating space for the planet (Rockstrom 2015). Is it possible to turn the negative footprint of cities on the environment into a positive one and make them part of the solution? How can cities become drivers for regeneration within their boundaries and beyond, over their bioregions? What are the necessary capabilities of cities leading to this transformation? What kind of urban design and planning would better

fit the challenge? What kind of alternatives to the megacities would prove more efficient in providing work of dignity and meaningful lives to the present and future generations? Is there any hope for the future of humanity and a healthy planet?

Before investigating possible solutions, it is necessary to understand the causes that provoked this state of concern in the modern urbanised world (these subjects are expanded in Chap. 2).

### *1.1.2 The Legacy of Modernism*

The mechanistic worldview has underpinned the world's economy over the past three centuries. This study acknowledges the achievement of huge economic growth with significant reductions in extreme poverty and the relevant numerous advances in science and technology that the mechanistic paradigm produced. But it also has led to many of the problems cited above. According to Buchanan (2012), one of the main causes of modernism's negative legacy is the fragmentation of the relationship between humans and nature that Buchanan describes as the core issue because this denial of human dependency on nature led to the lack of acknowledgement of nature's cycles and regenerative capacities.

The abundance of cheap fossil fuels (a fundamental basis of modernism) is another cause of the radical shift, revealed in ways of production and consumption, transport, land use and urban form. Cities sprawled very quickly, supported by inexpensive and plentiful fossil fuels, which provided energy to feed lighting, heating and cooling to buildings that could have enjoyed daylight and natural ventilation if any restriction to the energy sources had limited its consumption, or if responsible planning and design had been implemented (Buchanan 2012).

The modernist city aimed at accomplishing social and environmental improvements through rational planning in response to the crowded, unhealthy, polluted and undesirable mix of uses that characterised the urban conditions derived from the Industrial Revolution (Dunnett 2000; Buchanan 2012; Almeida 2013). It failed. It reiterated fragmentation in various planning aspects: in land use, by splitting urban space into zones of similar functions; in terms of circulation, it disconnected motor traffic from pedestrians and social activities; in abandoning the concept of the street as the element that articulates urban life (Jacobs 1961; Newman and Kenworthy 2015).

Fragmentation seems to be a core issue in Modernity. Disconnection from nature led to over exploitation of natural resources, infinite economic growth, pollution and contamination of soils and water bodies, even desertification in some cases. Cheap and abundant fossil fuels led to automobile dependence and disconnection of urban spaces (Newman and Kenworthy 1999), easing the way toward current unsustainability.

Many scholars and thinkers echo this view and advocate for the reunion of humans and nature as the only way to achieve true sustainability (Kellert et al. 2008; Salingaros 2010; Buchanan 2012; Mang and Reed 2012a, b; Beatley 2011). Hes and du

Plessis (2015, p. 25) clearly highlight that the biggest challenge is "escaping the trap of the mechanistic worldview" if we aim to leave a world of abundance to future generations. The Great Transition advocated by scientists (Rockström 2015; Steffen et al. 2007) has provided a quantitative basis for the necessity of the ecological worldview and a regenerative sustainability paradigm.

### *1.1.3 The Need of a Qualitative Shift*

> We cannot solve our problems with the same thinking we used when we created them. Albert Einstein.

The desired change requires a new mindset as the first step, a complex and necessary step. The ecological worldview and the regenerative sustainability paradigm (du Plessis and Cole 2011; du Plessis 2012; du Plessis and Brandon 2014) provide the theoretical framework for this new vision (expanded in Chap. 3). It embeds the whole and living systems thinking approach (Alexander et al. 1977; Reed 2007; Capra and Luisi 2014) and considers pattern literacy (Orr 1992) as an essential skill within the new paradigm for design practitioners.

In his essay *The Big Rethinking Part 11: Urban Design* (2013), Buchanan reflects on the need of redefining purposes to solve a wide scope of dangerous pressing issues inherited from Modernity, e.g. the myth of unlimited economic growth that led to human-induced climate change. Moreover, he states that this endeavour would require counterbalancing the modernist full focus on objective and quantitative aspects and redirecting attention to the subjective and qualitative, allowing for the desire to live according to personal values and aspirations (Buchanan 2013). This view is shared by Hes and du Plessis (2015) who discuss the mechanistic reductionist view as a hindrance to attaining effective solutions to the problems related to living systems. In a relevant article, du Plessis and Brandon (2014) recognise the value of knowledge built by the mechanistic paradigm for practical engineering approaches but advocate for the ecological world vision drawn from quantum physics, ecology, life sciences and neuroscience that has proved to be more appropriate and effective, particularly in the realm of design and development encompassing living systems. The redefinition of purposes involves holistic design for the built environment, which was profoundly affected by the modernist vision that missed the organic links to nature that had characterised centuries of urban growth.

The ecological worldview is fundamental to stop the vicious circle (Birkeland 2008) and to underpin a holistic approach that enables the reunion of humans and nature. Among the first voices expressing this goal, it is important to highlight two influential female thinkers in the early 1960s who have strongly shaped the sustainability discourse since then, promoting awareness of the importance of human habitats, both in nature and in cities. In 1961, Jane Jacobs published her seminal book *The Death and Life of Great American Cities* where she discussed the need to develop and adopt a new concept for cities. She demonstrated how modernist urban planning

produced harmful impacts on urban inhabitants. In 1962, another seminal book, *Silent Spring* by Rachel Carson, brought alertness to the effect of human actions on natural environments, resonating so powerfully around the world that it was instrumental in launching the environmental movement.

Jacobs (1961) argues that the key issue in city planning is the need to understand what kind of problem cities are. Building on Dr Warren Weaver's findings of the stages of development of scientific thought, Jacobs ranked cities as problems of organised complexity. As in the life sciences, cities present problems in which several variables are interacting simultaneously "in subtle, interconnected ways (…) interrelated into an organic whole" (p. 433). Jacobs contends that urban design and planning only can progress if city problems are understood as the kind of problem at issue. She notes that the tactics for understanding the problems posed by cities and the life sciences are similar in that both types of problems have to be analysed in detail (Jacobs 1961).

In Jacobs' views, the most appropriate methods to understand cities are:

- Thinking about processes,
- Working inductively, reasoning from particulars to the general, rather than the reverse,
- Seeking for "non-average" clues involving tiny quantities, which reveal the way larger and "average" quantities are operating (Jacobs 1961, p. 440).

Jacobs' thinking about urban issues has been influential and further broadened by thinkers and theorists in whole systems thinking approaches, such as Capra, Alexander, Orr, Salingaros, Mehaffy and others. These ideas and concepts are expanded in Chap. 2.

## 1.2 Understanding the Value of Nature and the Urgency to Reconnect Human Mindset and Activity with the Natural World

Nature has historically been the life support and inspiration of human beings because we are part of nature and have evolved immersed in it (Kellert et al. 2008). As aforementioned, the Great Acceleration, known as the overwhelming human activity on natural environments, promoted immense progress that favoured humans but also led to the over exploitation of natural resources, negatively affecting vital ecosystems leading to the current global human health, environment and climate emergency. This situation is affecting social and economic systems and, importantly, the safe operation of the planet because four planetary boundaries have already trespassed, as earth scientists are warning (Steffen et al. 2007; Rockström 2015).

According to a relevant body of research and global policies, the most imperative actions should be focused on significantly reducing carbon emissions (IPCC 2018, 2021; Newman 2020) and restoring the damage already done to critical ecosystem services that sustain life on the planet (UNEP 2020; Pedersen Zari 2012, 2018, 2019).

Although ecosystem services are essential to all living systems survival, human and non-human, economic development does not consider the value of these functions in the cost of global production (IPCC 2018; WEF 2020a, b, c).

The unprecedented destruction of natural habitats has spread zoonotic viruses, prompting deadly diseases like the Covid19 pandemic that is killing millions of people worldwide and precipitating a structural economic crisis. This is demonstrating the urgency to transition toward a nature-positive (WEF 2020a, b), low-carbon economy and society (Newman 2020) to ensure the right of living healthy lives, within the planet's boundaries. Frequent and free contact with nature for all has become mandatory and is a human right (Beatley 2011). Nature is essential to the functioning of cities (Beatley 2011); thus, accelerating the uptake of nature and green infrastructure into urban fabrics is a key driver of urban resilience (Newman 2020). This is supported by the United Nations New Urban Agenda and the United Nations Sustainable Development Goals (SDGs).

## 1.3 Shifting Worldviews

Worldviews are ways of thinking about and lenses to look at the world; they organise visions and systems of beliefs and guide the interpretation of the various phenomena that shape the space we inhabit. They define the paradigms or subsystems that arrange the ideas or basic assumptions to study the phenomena, allowing for the design of appropriate strategies and promoting a common language among thinkers, researchers, practitioners, stakeholders and people involved (du Plessis 2012; Hes and du Plessis 2015). The value of working within a worldview and paradigms is that they provide a broad comprehension of reality; this is clearly stated by these authors,

> a consciously held worldview can shape new practices and transform the way we engage with the built environment. (Hes and du Plessis 2015, p. 112)

And,

> It describes the structure, function and nature of the world and provides guidance on the general principles by which we should organise our actions within this world: how we would act and create and how we can influence and transform the world. As such it not only engages with our scientific understanding of the world, but also with our value systems and ideologies, as well as our ideas about sense-making, problem solving, decision making and correct action based on how we evaluate reality and the possible futures to which these actions may lead. It is therefore far more than a scientific explanation of the physical universe. (du Plessis and Brandon 2014, p. 2)

The emerging ecological worldview and its regenerative sustainability paradigm (du Plessis 2012) support a significant evolution in the sustainability field. The concept of regenerative sustainability is founded on the principle that the threats to sustainability only could be addressed in a positive manner if

> humans and their activities are rewoven into mutually beneficial, harmonious relationships within the larger web of life, thus restoring the inherent regenerative capacity of natural and social living systems. (Benne and Mang 2015, p. 8–9)

Hes and du Plessis (2015) argue that the ecological worldview embeds two aspects, one tangible or external related to the biophysical sphere or perceptible realm, as well as the social structures, e.g. economic or legislative systems. The other is the internal aspect that entails the mental, intangible, invisible realms related to the field of thoughts, feelings, values and human interactions. Together they form the systems in which human life and activities take place.

In regard to the built environment, the regenerative sustainability paradigm considers the city as a "phenomenon originating from and created by both mental-social and technological-natural processes" (du Plessis and Brandon 2014, p. 6). This means that systemic planning and design processes must involve both the interior aspect comprising individual and collective values systems and the biophysical or exterior side. This appreciation is based on St Isidore of Seville's definition of a city as formed by two indivisible parts: the *urbs* or physical aspect and the *civitas* or mental part including the emotions, rituals and rules (quoted in du Plessis and Brandon 2014). This concept is also related to the understanding of the built environment as a social-ecological system, which is expanded in Chap. 3.

## 1.4 Incorporating Social-Ecological Approaches to Urban Design and Planning

Cities can actively contribute to the aspirations and needs of their citizens, both in their physical and psychological aspects. This book presents an investigation on the concepts of biophilic urbanism and regenerative development to see how the integration of these two design approaches into urban design and planning methodologies could promote insights and further knowledge and practices to address the challenge.

Biophilic urbanism is based on the work of biophilia's main theorists starting with the American biologist E. O. Wilson, who defined biophilia as the innate affiliation of human beings with all forms of life (Wilson 1984). Hence, biophilic design emerged as a discipline and methodology that explores ways to facilitate the proximity and easy contact between people and nature, creating and applying design solutions for buildings and places. According to recent research, the benefit from this contact is crucial for human health and wellbeing, but it depends on repeated experiences because to be functional it must be nurtured and developed (Salingaros 2010; Kellert et al. 2008; Kellert and Calabrese 2015). The reconnect to nature occurs particularly when the design interventions are based on the ordered complexity of natural structures and adapted to human sensibilities (Salingaros and Masden 2008; Kellert et al. 2008). Beatley (2011, 2016) expanded biophilic design to the urban scale developing methods and strategies to improve urban design and planning projects. He explains that the application of biophilic urbanism provides opportunities for fulfilling experiences of nature, creating abundant green urban spaces that facilitate the necessary "daily dose of nature" (2011, p. 154) that bolster the reconnection of city-nature and consequently, people-nature. Besides promoting human health and wellbeing,

biophilic urbanism contributes to urban and regional regeneration of ecosystems and biodiversity by providing habitats for wildlife species, restoring damaged areas and affording a foundation for other ecosystem services in urban settings (Pedersen Zari 2018). Beatley studies the biophilic benefits implemented at diverse scales and argues that many places around the world show positive outcomes derived from small projects that facilitated interactions of people with nature. So, through the enjoyment and appreciation of the benefits obtained from nature, urban populations can be powerful allies in the conservation and stewardship of nature, not only within urban boundaries but also beyond.

Regenerative development is a holistic approach to the built environment calling for a new mindset. It has an ecological, cultural and psychological essence because it works on the potential of place, integrating systems thinking and promoting "the ability of living beings to co-evolve so that our planet continues to express its potential for diversity, complexity and creativity" (Mang and Haggard 2016 p. XIV). This approach enables the implementation of restorative and regenerative initiatives that show how existing degraded precincts can be revitalised and new ones can be designed as multifunctional, quality-built environments that are able to regenerate social and natural systems (Hes and du Plessis 2015). Mang and Reed (2012a) describe the difference between regenerative development and regenerative design, stating that the former allows the generation of a place's specific knowledge and its application to the design process to produce life-boosting social-ecological built environments ensuring regenerative outcomes. Regenerative design takes design to a higher level aiming to stimulate new life and health opportunities within the web of living systems existing in a place and affected by design approaches generated by the fossil fuels economy (Orr 2016, p. VII). Hence, this approach fosters a substantial advance in the understanding of sustainability, leading to the regeneration of built environments and communities (Mang and Reed 2012a, b).

The combined application of regenerative development and biophilic urbanism creates the potential for cities to become a source of restoration and regeneration of waterways and degraded areas within and beyond the urban boundaries into the surrounding bioregion (Zingoni de Baro and Macedo 2020).

Biophilic urbanism and regenerative development share many principles and have an intrinsic synergy (Zingoni de Baro 2015). Both are integral strategies to the regenerative sustainability paradigm and involve a new way of understanding the built environment, enhancing the value of nature and resetting people back as part of it, a foundation for the new nature-positive world. However, the necessary transformative and meaningful change depends not only on governments' actions. To be truly transformative and sustainable, building social capital is crucial to engage in healthy and sustainable relationships with all living systems (Bush et al. 2020; Zingoni de Baro 2020).

These approaches are described in depth in Chap. 4.

## 1.5 Looking into the Future of Cities and the Next Generations

> In an urbanising world, we must learn to take pleasure in protecting the integrity of nature.
> Herbert Girardet

The purpose of this book is to contribute a foundational and practice-oriented concept for the (re)design of present and future urban settings where people and nature can flourish together.

This concept, named regenerative sustainable urbanism (Zingoni de Baro 2015), aims to encourage will and agency in design practitioners, local communities, local governments, stakeholders and organisations to stimulate creative thinking, behavioural change and action envisioning a nature-positive world. The book presents the synergy inherent to biophilic urbanism and regenerative development reflected into a framework integrating principles and practices. The framework can be used to test existing urban environments or guide the design of new ones. The intention is to set out how the design strategies that underpin them are affecting the potential of those places to create opportunities for social and ecological systems to evolve together, mutually benefitting and transforming the polarity of impacts by turning negative ones into net-positive outcomes. The utter aim is about helping to transition toward a culture of regeneration to ensure present and future generations' right to live safe, healthy and creative lives.

As designers, we need to think about and design built environments in a way to attract and sustain nature everywhere, inside and onto buildings, neighbourhoods and entire cities, creating opportunities for repair and regeneration of ecosystems and promoting behavioural change in communities and organisations. Therefore, urban transformations based on the re-integration of nature into cities is a step forward towards a nature-positive world. Creating urban habitats for ecosystems and biodiversity is creating urban natural capital and is founded on the role that biodiversity plays in resilience and sustainability. This is supported by the United Nations New Urban Agenda and the United Nations Sustainable Development Goals, specifically the SDG 11—Sustainable Cities and Communities and the SDG 15—Life on Land. These two statements are important to overcome the still ongoing belief that urbanisation and natural areas are incompatible (Weller et al. 2019).

It should be noted that this approach incorporates not only natural ecosystems, it considers society and culture and, as is the case of cities, it includes design as a cultural ecosystem service. Landscape architecture theorist Elizabeth Meyer (2008) argues that designed landscapes and biophilic elements have the essential ability to create memorable places where human activities and ecological processes coexist. This aesthetic experience can promote awareness and restorative sensations in our psyche that, in turn, can inculcate environmental values and lead to the appropriation and care of place (Meyer 2008).

Instead of seeing the increase of urbanisation as a threat to the future of the planet and humankind, it is possible to begin to imagine a future where cities can be seen

as potential contributors to the health, nourishment and regeneration of a world in which all communities can thrive and flourish.

This may seem somehow naïve. However, when scientific evidence is showing that the only planet we have to live in is starting to operate in a risky zone and the world we know will not be the same in a relatively short time, a sense of urgency impels us to take action. The writing of this book allowed me to observe that the sentence 'the world that we know' has diverse interpretations: some may understand it as the safe place to be, ignoring the effects of increased global warming or the emergence of zoonotic diseases due to the destruction of natural environments. Others may see in it the opportunity for change that frees the world from the causes of its current state and challenges. This second position embeds new energy that can lead to transformative change and hope (Reed 2007; Newman and Jennings 2008; Salingaros 2010; McLennan and Reed 2013; Hes and du Plessis 2015).

Regenerative sustainable urbanism has international application, opening the study to urban precincts and cities around the world, both in industrialised and developing countries, with the necessary consideration of the uniqueness of each place.

## 1.6 Book Structure

This book consists of nine chapters positioning the current research within the related literature to the topic of regenerative sustainability and organising the discussion on how cities can be part of the solution to the current challenges the world is facing.

To provide a background, Chap. 2 reviews existing knowledge about the challenges posed by the Anthropocene to the highly urbanised world and undertakes a review of the current state of cities as a corollary of Modernity. This includes the revision of the historical context and processes that caused the present challenges and the critique of the urban utopias of the last century, particularly the critique of modernist urbanism.

In search for solutions to the fragmentation of Modernity, Chap. 3 explores the importance of worldviews and acknowledges the ecological worldview as the foundation for this research and influences the understanding of the built environment as a social-ecological system. The chapter explores this concept and discusses the possibility of harmonic coexistence of urban ecology with social-cultural systems.

Chapter 4 discusses two social-ecological design approaches embedded in the regenerative sustainability paradigm: biophilic urbanism and regenerative development. From the comparative analysis of the theoretical principles and applications of both perspectives, it looks for convergence and overlapping of tenets that could lead to the formulation of a framework to guide and test these social-ecological design approaches to the built environment.