The Routledge Handbook of Sustainable Cities and Landscapes in The Pacific Rim

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First published 2022

ISBN: 978-0-367-47114-9 (hbk)
ISBN: 978-1-032-18994-9 (pbk)
ISBN: 978-1-003-03353-0 (ebk)

Chapter 37

Introduction to Section 6

Greenspace for healthy living

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DOI: 10.4324/9781003033530-43

Routledge
Taylor & Francis Group
LONDON AND NEW YORK

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Greenspace for healthy living

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Urban natural spaces can be sites of psychological restoration that improve physiological well-being and contribute to overall health for people living in cities. Though our cities differ in composition and our cultures have different conceptions of nature, urban residents across the Pacific Rim appear to benefit from some interaction with nature. Urban nature is situated within a diverse range of landscape types: greenspaces such as parks and greenway corridors, blue spaces such as waterways and shorelines, and gray spaces such as redesigned industrial lands and hybrid infrastructures. In the past decades, research has focused on building an understanding of how urban landscapes impact health outcomes. It is increasingly evident that exposure to urban nature, particularly greenspaces, positively impacts human health. From this research, we can suggest evidence-based landscape design directions to improve the health and well-being of urban residents and suggest future directions for further collaborative research.

Context

Urban life is known to have negative health implications due to a range of factors. These include poor air quality, noise pollution, urban heat stress, a reduction of community networks, and a loss of place identity. These factors, in combination with sedentary lifestyles of modern urban living, present considerable concerns about mounting public-health expenditures in cities worldwide. This book section introduces the relationship between the natural environment and human health and well-being. It looks at cross-cultural definitions of nature and urban greenspace as a way to understand some of the nuance and benefits of communicating both between disciplines and between cultures. Shared societal challenges such as intergenerational differences in nature exposure and affiliation and urban-rural nature gradients demonstrate shared points of understanding. This book section aims to share stories of success, research outcomes, and collaboration to inspire nature connections in our cities. The section highlights notable green infrastructure projects within Pacific Rim cities that are leading the way in bringing nature back to the inner city. From Vancouver to Melbourne to Singapore, innovative programs aim to connect urban residents with nature. Programs such as these likely exist in all of our cities, but without an ability to share their successes and challenges in international forums, their reach is limited.

DOI: 10.4324/9781003033530-43

Landscapes for health

We know that non-communicable diseases (NCDs) such as cardiovascular diseases, cancer, diabetes, or chronic respiratory diseases already account for a large share of global disease burden (Lopez & Murray, 1998; Lozano et al., 2012; van den Bosch, 2017). The World Health Organization (WHO) estimates that by 2020, 80% of the global disease burden will be NCDs (Wang & Wang, 2020). NCDs are related to lifestyle factors and these are linked to urbanization. Studies have found that urbanization correlates with changes in diet and decreases in physical activity that can increase NCDs (Wang & Wang, 2020). Social determinants of health (SDHO) include income, education, working conditions, housing, environment, food security, and social inclusion, many of which are related to levels of urbanization. Studies suggest that 30–55% of health outcomes can be accounted for by SDOH (WHO, n.d.). Programs such as the WHO's Healthy Cities program or the Alliance for Healthy Cities aim to improve both physical and social urban environments for population health (WHO, n.d.). These programs include initiatives to increase social connections, physical activity, and other healthy lifestyle behaviors. Research has shown that the urban environment influences healthy behaviors, with urban natural spaces increasing mental health, physical activity, and social connections (Huang et al., 2017; Jennings & Bamkole, 2019). While global studies, and studies across the Pacific Rim, show that increased nature exposure is correlated with better population health, research is still looking to find causal links between nature and human health and well-being (Donovan et al., 2013). This book section highlights studies and initiatives working to deepen our understanding of these connections between people and urban nature.

Lifestyle and intergenerational differences

As cities are growing, there is an opportunity to address pathways to health through increased access to high-quality greenspaces that benefit all members of society. This brief section brings a generational lens to this discussion, highlighting how concepts such as intergenerational nature amnesia impact our efforts to bring nature to our populations. Few would argue that modern living is increasingly disconnected both from nature and from human community. Social isolation is receiving important research attention. A 2017 study in Vancouver, Canada, by a local foundation found that one in seven residents felt lonely, and that one in four was isolated (Vancouver Foundation, 2017). A report on social isolation and loneliness in seniors in Victoria, Australia, estimated that an average of 10% of Victorian seniors experienced detrimental effects (State of Victoria, 2016).

Humans in different stages of life experience nature in different ways. Very young children can find delight in the mundane and tiny, while slightly older children need space to play social running games. Teenagers may use natural spaces to find separation from adults and build independence (Mäkinen & Tyrväinen, 2008). Young adults and adults may use greenspaces to exercise, socialize, or find respite from busy lives. As people age, accessible greenspace takes on increased importance as mobility declines. Takano et al. (2002) found this in their influential research that found increased longevity for seniors living in walkable green urban environments.

We have also witnessed a major shift in lifestyle between generations, largely away from contact with nature. Studies across the world have noted children's decreased familiarity with the natural environment when compared with their parents as adults (Kahn, 2002; Louv, 2008). As we rely on globalized economies, our relationship with the products of

nature becomes increasingly abstract. Produce is no longer limited to seasonal production; oranges, kiwifruit, and berries are all continually stocked in markets throughout the year. It can become difficult to remember that these foods do not ripen year-round and that changing climates and seasonal shifts are disrupting production globally. The majority of people may only experience slight price fluctuations without realizing the extent to which the global food system is having to shift and adapt to climate change. And yet food is arguable our most direct relationship with nature. Other relationships are experiencing even greater distance.

A widely cited study found that young children could recognize more Pokémon than local animals (Balmford et al., 2002). Urban children and adolescents across the Pacific Rim spend less time outdoors and in contact with nature than their parents did, despite widely studied benefits of nature contact (Li et al., 2018; Mustapa et al., 2015). These studies have led to efforts to increase opportunities for young people to engage with nature. School gardening programs in Australia, outdoor classrooms in Canada, and outdoor education programs in Singapore all aim to give interested youth opportunities to spend time in nature. In Australia, for example, the Stephanie Alexander Kitchen Garden Foundation (Stephanie Alexander Kitchen Garden Foundation, n.d.) brings food education to nearly 2,000 schools and early learning centers. Their program includes food growing, healthy recipes, and cookery lessons to encourage healthy eating habits. In Canada, a growing interest in outdoor education has led to an increase in forest schools (Child and Nature Alliance of Canada, n.d.) for children from early childhood through to secondary school graduation. There are nearly 50 outdoor schools and many more programs that offer partial days or shorter programs that allow kids to spend time in nature. In Singapore, the National Parks Kids for Nature (PAL Outdoor Education) program brings lessons into the classroom and schoolgrounds to enable children to feel safe and comfortable playing outdoors (National Parks, n.d.). These initiatives highlight the increased concern that intergenerational nature amnesia is impacting our children's well-being.

Cross-cultural nature definitions

While global patterns of human health/urban nature connections are emerging, it is important to note that countries across the Pacific Rim define and conceive of nature differently. This has important implications for evidence-based landscape design for human health. The brief exploration of translations of the word nature in Japanese, Mandarin, Malay, and Tagalog below highlights how different cultural understandings of nature create context-specific design interventions that may need place-specific data. The exploration is also intended to demonstrate how communication of nature-human connections between cultures can bring about deeper cross-cultural understandings and potentially greater impact of design interventions.

The definition of the word *nature* is often used in Western cultures in contrast to culture, but as Jense and Morita argue (2017) "even in the West, the dichotomy between nature and culture is far from straightforward" (p. 2). They suggest that it is more appropriately understood as a "matrix of contrasts" (Jense & Morita, 2017, p.2) rather than a dichotomy. This creates tension and difficulty in finding translations for other cultures. For example, the Japanese translation of nature as *shizen* 自然 was chosen in the early part of the 20th century, in part because of its contrast with *sakui* 作為 which translates as "an action or artifice that has changed according to human will" (Jense & Morita, 2017, p.5), thus representing the nature/culture dichotomy of Western thought. But *shizen* 自然 was not a noun, and instead

referred to the constantly changing processes that should not be intervened upon in order to create harmony in the universe (Jense & Morita, 2017).

Shizen 自然 is closely related to the traditional mandarin 自然 *ziran*. *Ziran* 自然 is a Daoist concept that can be defined as indicating movement and the operation of all species, but did not originally refer to physical objects (Wang, 2018). While translations were evolving as Eastern and Western cultures were interacting, the Japanese *shizen* 自然 was the earlier translation for nature. Over time, *ziran* 自然 became increasingly adopted as the Mandarin translation of nature because of its similarity to *shizen* 自然, which was being used as the translation of *nature* in Japanese.

Both *shizen* and *ziran* describe "the instinctive and spontaneous nature of substances" (Wang, 2018, p. 17) which is very different from the external materials suggested in the Western concept of *nature*. In common, the Western *nature*, Japanese *shizen*, and the Chinese *ziran* all speak of the ways of the material world and don't include any form of supernatural powers (Wang, 2018). This is different in the Malay word used for nature. The Cambridge dictionary suggests *alam semulajadi* for nature. Ho Abdullah and Hashim (2009) argue that the word *alam* includes the concept of rule by an all-powerful God (Ho-Abdullah & Hashim, 2009). The word *semulajadi* translates to "everything related to biological and geographical states" (Globse, 2020). Here we have a much wider use of the word nature that includes reference to the supernatural.

The word for nature in Tagalog is *kalikasan*. This refers to both health and nature, an appropriate concept for this book section. In the understanding of *kalikasan*, human-made objects and interaction are not considered part of nature. A concept in Balinese is also worth mentioning: *tjotjog*, which means to fit perfectly into one's environment. It is a concept of fitting into a place in a way that you unarguably belong there without intrusion or attempting to manipulate natural growth and cycles. This brief exploration of nature definitions from a small sample of Pacific Rim cultures highlights how culturally rooted attitudes toward nature might affect human actions toward or with nature. The understanding of nature in different cultures connects to a diverse range of philosophic and aesthetic traditions that require nuance in design response across the region.

Nature in the city

Nature, however, you conceive of it, is not the same as urban greenspace. This is another term which has many understandings (Taylor & Hochuli, 2017) which are relevant to data collection and design of cities to improve human health. For example, urban designers might approach the concept using a binary gray/green diagram of urban form (James et al., 2009) to understand greenspace. This simplicity is reflected in Jorgensen and Gobster's definition of "open land and its vegetative cover" (Jorgenson & Gobster, 2010). Swanwick et al. (2003) argue that the term greenspace is used to "emphasize that the green environment of urban areas is about more than only parks, gardens, and playing fields" (p. 97). These simple definitions do run the risk of missing the nuance and complexity of the range of green being planted in modern cities. Green roofs, green walls, modular plantings, and vertical forests are all being explored to increase the number of plants and thereby potential for nature contact. While much research has focused on urban greenspaces, urban blue spaces and some gray spaces make up important components of urban nature's contributions to human health. In a recent study by Rugel et al., the availability of blue space was associated with reductions in depressive disorders (Rugel et al., 2019). Similarly, urban gray spaces have long been acknowledged for their contribution to social interaction within cities (Whyte, 1980). Public

space, whether green, blue, or gray, has the potential to contribute to positive human health outcomes.

A range of design opportunities for a range of greenspace types

Greenspace types vary within cities, and along the urban-rural gradient. Design solutions and research needs will vary for green, blue, and grayspaces of different sizes and within different matrices. Within urban centers, greenspace is often fragmented, in smaller patches, and/or follows infrastructure or river corridors. Sushinsky et al. (2013) argue that biodiversity generally decreases as density increases above a certain threshold. However, higher residential densities on certain parcels of land could theoretically free up additional land that could be (but rarely is) used exclusively for ecological and natural systems. As global population growth combines with a current trend of urban migration to increase the population density of cities (Seto et al., 2011), urban greenspaces will have to provide a multitude of services in ever decreasing space. Even the smallest patches are likely to bring some improved health benefits to people (Barron et al., 2019). While large-scale transformations in urban greening, such as new parks, reclaimed river corridors, or newly planted greenbelts are important, our recent experiences of isolation during an international pandemic have taught us the importance of smaller, local, pieces of greenspace (Ugolini et al., 2020). These include spaces such as planter boxes, roadside verges, street trees, traffic circles, private yards, courtyards, green roofs, pocket parks, community gardens, parking lots, or empty/ vacant lots. Similarly, informal greenspaces occupy an "uncertain, interstitial niche in the urban matrix" (Rupprecht & Byrne, 2014, p. 598) that provides benefits to urban residents.

The matrix of residential habitation, built infrastructure, and greenspaces varies immensely across the rural-urban transect (Grove & Burch, 1997; Steward et al., 2008). Studies have looked across this gradient to understand differences in landscape types (McDonnell & Hahs, 2008; Radford & James, 2013). Generally, the balance of gray to green gets higher closer to city centers. A recent study of greenspace changes across Pacific Rim cities found the biggest changes in suburban and exurban areas (Jin et al., 2020). Jin et al. found that along the urban to rural gradient, Asian cities had both better-connected vegetation and greater vegetation increases than North American cities. The authors argue that planning strategies such as green belts, green wedges, and extensions have reduced greenspace fragmentation in some Asian cities (Jin et al., 2020).

Pacific Rim urban greenspace case studies

Many notable urban greenspace projects have been built or planned within the Pacific Rim region. In Vancouver, a city with high annual rainfall, the Rain City Strategy was adopted in 2019 to reimagine rainwater in the city. The strategy includes a performance target to capture and clean at least 90% of annual rainfall. A design standard aims to capture at least 48 mm of daily rainfall (City of Vancouver, 2019). The strategy includes pilot projects and significant investment in green infrastructure. In Manila, a city with limited remaining forest cover, Arroceros Forest Park (AFP) is a 2.2-hectare greenspace within the city and is considered as the "last lung" of Manila (Membrebe et al., 2017). The park is managed collaboratively by the city government, a local NGO, and other interest groups (Satnos et al., 2017). A recent study surveying social valuation of ecosystem services found that air quality regulation and climate and temperature regulation were the most highly ranked by study

participants (Lagbas, 2019). These two cases highlight strategies that were born of local context, but can be held as inspiration and adapted for other contexts and cities.

Chapters

Chapter 38 introduces the range of nature benefit theories that have emerged in the past 50 years. It then describes relevant studies that support these theories and illustrate key messages about human connections with nature. It presents research into what creates healthy landscapes and how these intersect with healthy human behaviors. It concludes with evidence of physical outcomes of nature exposure on human health.

Chapter 39 presents urban greenspace policies across scales. It introduces urban stressors such as climate change and urban heat and discusses how they are impacting the lived experience in Pacific Rim cities. The chapter then examines policies for urban greening to help combat these issues, with reference to the United Nation's Sustainable Development Goals.

Chapter 40 explores how new technologies are helping to measure health (both psychological and physiological) indicators and evidence-based practice of biophilic design in everyday life. By using interviews, biofeedback measurements, or fMRI scans, researchers are getting results to support the connections between a green healthy environment and human well-being. The examples provide an approach for designers to adopt the research findings into practical design and demonstrate how new technology can enhance experiments in related landscape research.

Chapter 41 concludes this book section with a discussion of the knowledge-action gap. The chapter examines possible reasons for this gap. It argues for an evidence-based approach, which is difficult in a field with a lack of generalizable results and governing bodies with oversight responsibilities. The chapter concludes with possible solutions and research results as a call to action.

The authors of this section come from diverse backgrounds and urban situations. Yet we all have the shared experience of living in or near cities that are growing in population and density while losing greenspace. We also share a passion for researching these connections from our own disciplinary perspectives. This book section provides an important opportunity to share our common challenges, unique research outcomes, and emerging policy solutions. This section highlights the great benefits that come from interdisciplinary collaboration in health and urban greenspace research. We encourage increased collaborative efforts across the Pacific Rim to share research outcomes, case studies, challenges and opportunities to increase the nature experience of our cities (see Figure 37.1).

Connections

Confronting issues such as climate change and societal changes are challenging the way cities will support healthy living into the future. Our world's climate system is changing in ways that will require humans to modify their current way of living (IPCC, 2018). In the Pacific Rim, cities can expect increased air pollution, drought, storms, and heatwaves due to climate change. These climate impacts will create harsher conditions for the people and plants in our cities. Air pollution is a major global health challenge. Urban vegetation makes a small, but important contribution to mitigating pollution (Morani et al., 2011; Nowak, 2013; Tallis et al., 2011). Similarly, the urban heat island effect can create unlivable conditions, particularly during heat waves. Various models and studies have shown that urban vegetation has some impact on reducing urban heat (Ziter et al., 2019), but have also revealed that it is a complex

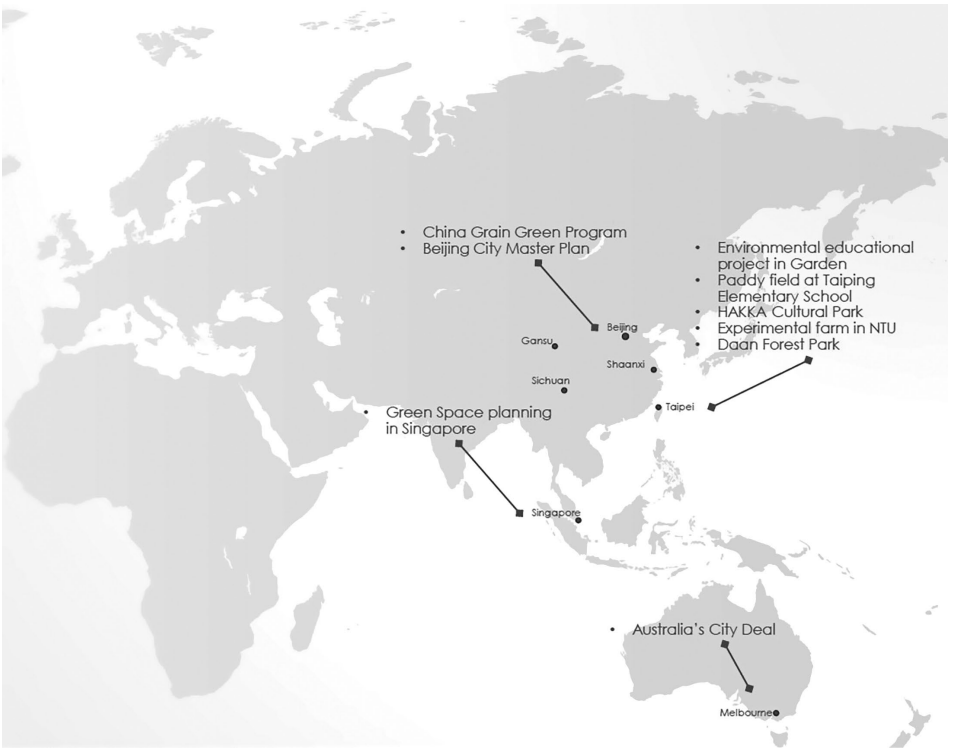

Figure 37.1 The map shows the case studies in the section of healthy living, which locates in China, Taiwan, Singapore, and Australia

relationship that requires further study (Livesley et al., 2016). In response to the above issues, the framework of the possible solution could seek with health, urban planning, and related interest groups to build the partnerships and fulfill the goals (Goal 17); take urgent action to combat climate change and its impacts (Goal 13); make cities and human settlements inclusive, safe, resilient, and sustainable (Goal 11); ensure healthy lives and promote well-being for all at all ages (Goal 3). By using evidence-based research through psychological surveys and physical measurements, researchers may get a better understanding to bridge the needs for public health and landscape.

Call to action

Our shared international experience during COVID-19 has highlighted the role that outdoor, accessible, public greenspaces can play in mitigating isolation and encouraging healthy behaviors. While most intuitively understand a connection between well-being and nature exposure, scientific theories about this exposure are still evolving. The international research community needs to continue gathering and analyzing data to help better understand people's experience of increasingly finite urban natural spaces. The Pacific Rim research community has an important role to play in quantifying and communicating positive messages of urban greening for human health. This applies to all residents in all cities across our region, and globally. Disparities in urban natural space availability became evident during the pandemic, highlighting existing issues of equity within city districts, across urban regions, and

between global cities. Not all pandemic-isolated people were able to access the respite and refuge provided by green or blue natural spaces, suggesting important policy directions for a post-COVID urban revival. The remaining chapters of this book section highlight evidence of positive benefits of greenspace on human health and with this evidence, we can begin to guide the design and management of greenspaces to maximize these benefits.

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