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Simona Azzali
K Thirumaran *Editors*

Tropical Constrained Environments and Sustainable Adaptations

Businesses and Communities

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About the Editors

Simona Azzali is a lecturer of urban planning and design at the Singapore campus of James Cook University where she coordinates the Master of Planning and Urban Design and teaches core modules, elective courses, and studios on disaster management, urban planning and sustainable urbanism. She is a member of JCU's Tropical Urbanism and Design Lab, an interdisciplinary team of geographers, architects, sociologists and planners interested in tropical urbanism, and JCU's Centre for International Trade and Business in Asia (CITBA). Prior to commencing her appointment at James Cook University, she worked and researched for various renowned academic institutions as the National University of Singapore, UCL London, Politecnico di Milano, and Qatar University. Simona Azzali is passionate about cities and a strong advocate of a people-oriented and participatory design approach to build better cities by design.

K Thirumaran received his Ph.D. from the National University of Singapore. He worked in the tourism industry for over 10 years both in Singapore and the United States. He is a member of JCU's Centre for International Trade and Business in Asia (CITBA). Currently and an academic at James Cook University Singapore where he specializes in business and tourism management subjects. He coined the term affinity tourism and his research focuses on service excellence, cultural and luxury tourism. *Service Excellence in Tourism & Hospitality: Insights from Asia* and *Management of Shared Services Centers in Asia: Examples from Malaysia & Singapore* are recently co-edited books among journal articles and book chapters published by Thiru.

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Chapter 1
Adapting to Constraints: Businesses and Societies in the Tropics

K Thirumaran and Simona Azzali

Abstract The topic on constrained environments and sustainable adaptations was drawn from an idea that the tropics faced significant and unique challenges shaped by geo-climatic conditions converging with the way communities have adapted. Most studies embrace multidisciplinary approaches to adopt a more compartmentalized and yet rich epistemological understanding of a phenomenon to a closely related discipline. Very few journal articles and books in the area of business and societies in the tropics focus on the different types of constraints and their sustainability strategies. Hence, this book is meant to drive the agenda to address issues that emanate from different parts of the tropics and enhance our understanding of the challenges and mitigation efforts made by business organizations and leaders as well as ordinary people and as a nation.

Keywords Multidisciplinary · Sustainable adaptations · Constrained environments · Communities · Businesses · Tropics

This book was conceived with the idea that there would be a collection of conceptual and applied research works that will inform practitioners and scholars of the unique sociocultural and political economy that businesses and societies, whose lives are very much integrated into the varying geographic landscape of the tropics. The tropics as a subject itself is an approach of a spatial concept, of a vast land, sea, and climatic conditions wrapped around the globe within the belts of the Tropics of Cancer and Capricorn (Karyono et al. 2017). The geophysical and human ecology varies to a large extent that businesses and societies in both inside and the interactive outside have placed so much emphasis on a place where nearly half of the world's population lives and thrives in various degrees. The biodiversity and adaptation to climates and

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terrain, provides an interesting study to understand the strategies of businesses and communities to sustain themselves.

Constrained environments are unique territories characterized by challenging circumstances, limited land, and natural resources. They can be places with a small municipal boundary or cities in which parts around them may be consumed by ocean, bay, or mountains. Those places face hard physical boundaries like coastlines and mountains, which in addition to policy decisions may limit height or density, can also serve to restrict capacity for industry and community expansion. The literature on tropical urbanism over the years have focused mainly on climate and environmental related conditions (Tiepolo et al. 2017), and resilience (Jha and Stanton-Geddes 2013; Prasad 2009). However, little attention has been paid to investigate constrained environments in tropical and subtropical regions and the mutual relationship between urban planning, communities, and businesses.

In the early centuries of colonial exploration and conquests the tropics was perceived as the 'other' world infested with disease and rodents while at the same time a land of mystics and myths (Tobin 2005). The tropics was a place to exploit resources to enrich the colonial powers and civilize the people (Bhattacharya 2012). Fast forward, past the postcolonial period, the tropics is an important region with huge economic potential and vibrant communities that encounters continuous negotiations and integration issues in the local–global matrix.

Sustainable adaptation is the way in which businesses and societies created strategic decisions to meet challenges. Sharing a common purpose and the ability to act collectively either as a business or community, readily responding to different scenarios or circumstances adds to their resilience (see also, McNeeley and McNeeley 2012; Musinguzi et al. 2016). Researchers who understand contemporary challenges for agricultural societies in the tropics, advocate 'climate-smart' strategies to mitigate the cycle of severe weather patterns with trade-offs between the concentration of a single type of crop and a variety of crops cultivation (Harvey et al. 2014). Elsewhere in the literature, researchers studying the Caribbean islands also call for an ecosystem approach to development especially in relations to soil quality and its use given the spatial constraints for competing economic developments (Atwell et al. 2018).

This book approaches the topic of constrained environments and sustainable adaptations with a critical assessment of the businesses and communities as reflected in each of the chapter contributions. By consolidating existing lenses of urbanism and creating new knowledge and practices that identify the quintessential strategies adapted to the environment and business landscapes, the chapters also trace their changes, interrelations, and evolution over the years. The works in this book present the tremendous dynamism businesses and societies are undergoing with the agenda of economic development and proclivities of societies to make a concerted effort for better lives. The edited book includes a collection of relevant concepts and cases covering the interrelationships between planning, businesses, and communities in constrained environments. Chapters include theoretical and empirical studies, and evidence-based analysis with strong qualitative and quantitative data. Additionally, the volume includes selected case studies representing cities that show unique

relations and patterns between the built and natural environment, tourism consumption, business development, and social resilience. The publication is highly interdisciplinary with contributions from scholars across social sciences and humanities, including, architecture and planning, tourism, and public policy. Through a diversity of approaches, the chapter contributions add constrained environmental conditions with empirical discourse.

Three themes emerge in this book (1) Enabling Resources with Sustainability Goals (2) Attracting Business with Local Frameworks (3) Designing and Planning for Urban Communities. Under an umbrage of these themes, various topics and cases have emerged in each chapter.

Chapter 2 by Sharma and Kamble is a conceptual research that explores how communities living in tropical constrained environments can build resilience through sustainable tourism. Based on extensive literature review in the fields of community development and sustainable tourism, the research defines a strategic framework model suggesting community participation has a key role in effective policy planning, decision making, implementation, monitoring, and evaluating policies leading to sustainable development of tourism.

Chapter 3 by Eijdenberg and Ostertag analyzes factors underpinning pro-environmental entrepreneurial behavior by surveying 140 micro-entrepreneurs in the food vending industry in Iringa, a community in the Southern Highlands region of Tanzania. Findings reveal that resource-conserving entrepreneurial behaviors and actions depend on entrepreneurial competencies and the micro-entrepreneurs' attitudes toward resource conservation, the latter of which is, in turn, crucially contingent upon the entrepreneurs' educational background.

Chapter 4 by Jamei and colleagues adopts a case study approach providing an insight into the planning actions that can be considered to meet sustainable development goals. Focusing on Bangkok, capital city of Thailand, the chapter shows how tropical municipalities can tackle challenges pertaining to climate change, economic development, and social inclusion.

Chapter 5 by Mazzetto explores and compares examples of sustainable reuse of heritage focusing on restoration projects recently completed in the Middle East. The examples were selected based on typology, scale of interventions, and restoration sustainability principles. This contribution fosters the adoption of a sustainable approach to heritage restoration to enhance local culture and traditions and the appreciation of national identity.

Chapter 6 by Azzali et al. analyzes the current situation of tourism in Bhutan and discusses the opportunities and challenges of ecotourism in this country. It combines Bhutan's tourist data, the current tourism policy of the Bhutanese government and the government's measures for culture and environmental protection, offering insights on how to improve and maintain the sustainability of Bhutan's natural and cultural environment by enhancing its ecotourism industry.

Chapter 7 by Minh et al. focuses on tourism policy of Bhutan and the Maldives. The chapter starts with a comprehensive literature review addressing environmental constraints and sustainable adaptations in tourism; continues with an analyses of tourism activities, environmental constraints, and sustainable adaptations to identify

the basis for the tourism policies framework of the two countries. Finally, the chapter shows how resource-based policies is a key determinant of the destiny of countries engaged in global tourism.

Chapter 8 by Chau and Geng explores the concept of urban village (UV) and, through the analysis of four case studies in Guangzhou—China, shows how businesses operate in these particular urban typologies. The chapter shows UVs can offer ample business opportunities and affordable residential units for migrant workers and low-income minorities as they offer numerous business typologies that are mostly inclusive, self-sustainable, and self-developed. Understanding the commercial features of Guangzhou's UVs can help the development of appropriate strategies and policies to improve the conditions of further UVs in mainland China.

Chapter 9 by Selvaraj et al. undertakes a political economy disciplinary approach to examine the politics and economics of Sri-Lanka and Vietnam which are dependent on foreign direct investments (FDI) to fast track their quest for national development. The chapter offers firstly a profile of both countries, then identifies challenges and mitigation efforts to attract FDI and concludes with a series of adaptive strategies to attract foreign direct investments.

Chapter 10 by Wood et al. investigates how food security in resource-constrained urban environments is addressed through an urban planning strategy and legislative agenda. The chapter adopts a case study approach by examining examples from Canada, Brazil, and Singapore to shed light on how strategic urban planning initiatives and specific government regulatory provisions can help alleviate some of the food security challenges that resource-constrained environments present.

Chapter 11 by Cipriani investigates a series of environmental, urban, and human issues facing the heritage city of Melaka, Malaysia and proposes a series of design scenarios to tackle those complex issues at the city and regional scale. With the belief that landscape is not only an environmental resource but has also an economic value, this piece advocates landscape design can lead to an alternative and more sustainable development of the territory and its cities and people.

Through a case study approach, Chapter 12 by Jamei and Habibi offers urban design solutions by presenting three main cooling techniques—shadings, wind modification, and green infrastructure applied to three Malaysian cities: Malacca, Muar, and Putra Jaya. While the results of the case studies are beneficial for urban planners in better integrating urban climatic knowledge into planning practice, the authors aim to establish a framework of heat mitigation methods that can be especially practical for tropical constrained environments.

Chapter 13 by Wong et al. analyzes the effectiveness of waste management in Singapore and reviews the various approaches undertaken by the Singapore Government to align its waste management efforts with the Sustainable Development Goals (SDGs) of the UN 2030 Agenda. The study uses a qualitative methodology, through an integrative review of the literature, and provides insights into a global issue relating to plastic waste management and its challenges.

While a single volume cannot do justice to the vast challenges and opportunities pertaining to tropical constrained environments, this book is, however, designed to provide key insights as a step toward further theory and practice. Being highly

interdisciplinary, this volume may be of interest to scholars across social sciences and humanities, including urban studies, urban planning, urban design, geography, tourism, business, and public policy. Adopting a multidisciplinary approach to the chapter contributions, we can include a variety of well-known specialists in their field and a mix of international researchers. Drawing on these multifield and international reach, readers will benefit from the diverse insights and highlights of life in the tropics.

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Part I
Enabling Resources with Sustainability Goals

Chapter 2
Strategic Framework: A Roadmap for Communities' Adaptations and Resilience in Constrained Environments

Ruchi Sharma and Zilmiyah Kamble

Abstract Unanticipated, unpredictable social and environmental changes adversely affect communities living in tropical constrained environment. This conceptual paper investigates the adaptations and resilience of communities earning their livelihood through the tourism sector. This chapter is built through extensive literature reviews and proposes a conceptual framework focusing on community development, sustainable development and tourism. The proposed strategic framework model highlights the need for engagement of resident community in the process of tourism development in constrained environments. It suggests that the community participation will be helpful in effective policy planning, decision-making, implementation, monitoring and evaluating policies. The significant contribution of this research is in the continuous engagement of community members in the planning of tourism activities, through the strategic framework. The insightful information on implications of community participation will be helpful for researchers, policy makers and especially the tourism industry.

Keywords Resilience · Adaptations · Constrained environment · Community participation · Sustainability

2.1 Introduction

Change is an inevitable factor and the response toward change varies from person to person. People can seek to adapt to the change or choose to be resilient in the process of change. There is a difference between being adaptive and being resilient. In Psychology, 'resilience' is considered as a trait which reflects general ability of a person to overcome challenges and to acquire new capabilities thus emerging

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stronger from the struggle. Psychologist, Rutter (2000) has defined resilience as relative resistance to psychosocial risk experiences. This definition focuses on a range of outcomes and these outcomes are not limited to positive ones. It is not necessary that protection lies in positive experiences and it also does not assume that the answer lies in how an individual copes with the negative experiences. 'Adaptation' refers to both a process and its outcome. 'Adaptation' is considered as a state, referring to how a person deals with a specific stressor thus focusing on managing existing resources. According to Boudon (2002) adaptation is found in changes in the individual at the beginning of the development of aptitudes to integrate and acquire the feeling of belongingness to a group or community.

A community consists of a group of people. It is formed by the group of people living in a common geographical area and having strong feeling of being 'one' or collectivism. Sociologist MacIver and Page (1949) defines community as "*whenever the members of any group, small or large live together in such a way that they share, not this or that particular interest, but the basic conditions of a common life, we call that group a community.*" According to Murphy (1988), communities are groups of people residing in the same region with common interests and identity and they represent a bonding of people and place which creates its own distinctive character and force for survival in an increasingly impersonal and big economic-oriented world. Wisansing (2008) views the meaning of community from a geographical perspective and defines it as a body of people living in the same locality. As per Richards and Hall (2000), community is a local social system having its own ideology. From the various definitions stated above it is evident that community refers to the group of people living in a geographical area and is socially cohesive.

Communities in tropical constrained environments live in the most vulnerable ecosystems and must face the challenges of frequent climatic variations. They need to deal with challenging man-made circumstances or limited natural resources and the development in these regions is lagging (Sachs 2001). Communities are most vulnerable to economic loss and environmental hazards that could disrupt livelihoods and community well-being. The challenge for survival is multiplied with the changes in occupations as some of these communities are shifting from traditional occupations (hunter, food gatherer, etc.) to agriculture, industrial or tourism-based occupations. This paper investigates the adaptation and resilience of communities 'earning their livelihood through tourism in constrained environments. It highlights the significance of community participation in sustainable adaptation for sustainable tourism development.

2.2 Literature Review

Communities surviving in constrained environments respond to unpredictable social and environmental changes. They constantly struggle for adaptation to the natural as well as social environment. For the development of such communities there needs to be a balance between the investment made and the adaptation of the communities.

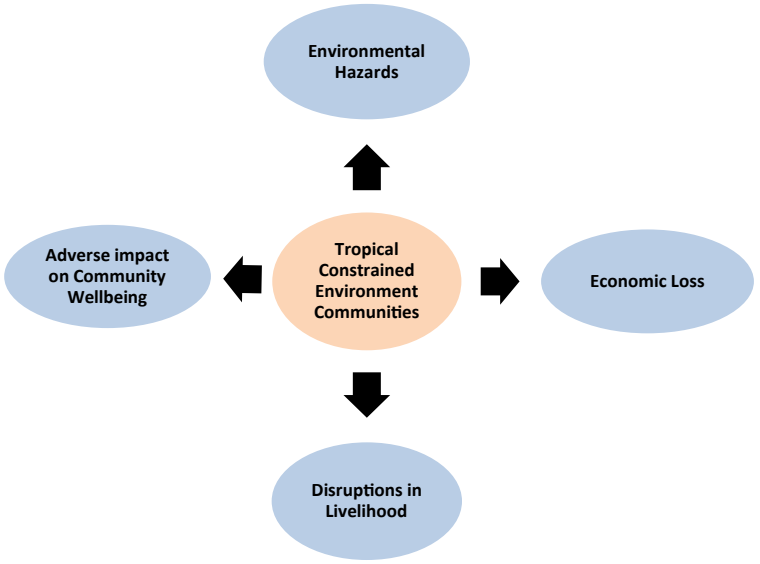

Fig. 2.1 Problems of communities living in constrained environments

The goal should be to fulfill the economical need and the safety of the people without disturbing their natural habitat as any unplanned change in their existing condition will have rippling effects on the entire community. Displacement of communities has led to impoverishment, loss of traditional livelihoods and even loss of culture (Kamble et al. 2020). Additionally, unforeseen social and environmental changes can lead to environmental hazards and have an adverse impact on the well-being of the community. The problems of communities living in constrained environments can be noted as seen in the figure (refer to Fig. 2.1). Thus, there is a need for a sustainable approach to solve these problems and strengthening the community to earn their livelihood by reviewing the policies and maximizing community participation. As per OECD (2010) "the sustainability of a destination depends on the ability of the diverse range of stakeholders, across levels of government, business and local communities, to work together to implement suitable measurement and regulatory instruments for ensuring community- and environment-friendly outcomes."

2.2.1 Communities' Adaptations and Resilience for Sustainable Development

Sustainable development is a framework for community and social development; it involves long-term perspective on optimum resource utilization. According to Baker (2006), the three pillars of sustainability are economic, environmental and social.

The role of framed policies is important to achieve the goal of sustainability. Hall and Lew (2009) referred to sustainable development as triple bottom-line, in which policies and actions attempt to balance social, economic and environmental costs and benefits. In the goal of achieving sustainable development the major issues faced by cities and towns in Asia are due to the lack of planned social, environmental and economic development leading to congested traffic, environmental degradation and housing shortage (Ichimura 2003). It is essential for communities to keep exploring the ways to protect and disseminate what is essential for their survival. In the process of sustainable development, the communities need to be enabled to face the challenges. According to Edwards (2009), sustainable development is considered as one of the most common prescriptions for making a community more resilient. The ability to bounce back from the negative experiences may reflect the innate qualities of individuals or be the result of learning and experience. Noltemeyer and Bush (2013), suggested that resilience relates to adversity and helps communities to adapt to adversity by interacting and transforming. Sustainable adaptations will contribute to an improved resiliency within the local community. The sustainable adaptation results in survival of communities and businesses. Klein et al. (2007) opines that adaptation is sustainable if it contributes to social justice and environmental integrity and leads to changes in technology, institutions and managerial systems.

The imposed limitations on communities existing in constrained environments need to be effectively dealt by strengthening its resources and capabilities for community survival and the business expansion. According to Folke et al. (2002) resilience at the human community level is the capacity of a place which includes its members and support systems in maintaining positive functional relationships, resolving emerging issues and work collectively to rebound from adversity by strengthening its resources and capabilities**.** In order to achieve sustainable adaptation, it depends on community's ability to rebound and reorganize during the challenging times. A sustainable community is more resilient as compared to the community that has not adopted significant sustainable development policies (Folke et al. 2002). However, while working toward policies formulation and implementation the rights of the community members should not be overlooked. The rights of local community must be integral while considering sustainable development (Howie 2003).

The presence of strong social networks, sense of belongingness and mutual trust exists among community members and in their willingness to work toward achieving the common goal. The collective efficacy maintains the involvement of community members as people expect that one's group will be able to achieve social change through collective action as in-group members will reciprocate cooperation (Bandura 2000; Simpson 2006). The community members trust each other more and exercise informal social control. People treat in-group members more favorably than out-group members as they expect favorable treatment from in-group members (Yamagishi and Kiyonari 2000). Therefore, the community members' opinions are essential in successful implementation of planned projects. Rather than destroying and then putting efforts in restoring the natural habitat of communities, it is better to adopt a strategic approach based on substantial information for maintaining the ecological

and social environment. Thus policies of adaptations and resilience need to be crafted to gain long-term benefits without increasing the risk factors.

2.2.2 *Role of Urban Planning: Policy Framework-a Strategic Approach*

There exists mutual relationship between urban planning, communities and businesses in tropical and subtropical regions. Yet, Henderson (2010) points out that policy framework is essential and legal regulatory frameworks need to be considered. The responsibility of the urban planning as well as implementation and monitoring is on the government. According to Vujičić et al. (2010) government has significant role to play in the planning, creation, designing of policies in addition to managing infrastructural systems, creating and enforcing regulations, developing of standards and monitoring. Good governance is responsive to the present and future needs of society (UNDP 1997). It is participatory, consensus-oriented, accountable, transparent, responsive, effective and efficient, equitable, inclusive and follows the rule of law (UNESCAP 2005). A good governance mechanism enhances the effectiveness of policy implementation. Good governance mechanisms include integrative planning, timely and actively informing and involving stakeholders in policy framing process as well as in decision-making (Montgomery et al. 2004). In relation to tourism industry the role of governance is important and is not just limited to planning of policies and its implementations. Governance highlights the issues such as visitor numbers, expenditure, employment creation and social impacts (Carlsen 1999). Tourism policy should help firms and destinations in the development of sustainable tourism (OECD 2010). Using top-down approach or bottom-up approach is always debated in the planning process. The top-down approach refers to the development planned by experts who are leading the process whereas bottom-up approach focuses on the participation of community and the community members are involved selecting their own goals as well as means to achieve them. At the international or national levels the policy decisions have generally been top-down approach whereas at the local level bottom-up approach is followed but as observed by Brooks and Adger (2005) the policies that are designed to address regional level issues also had great impact at local level and thus involving little to no consultation of local community leading to resistance and resulting in the increase in the problems and had an adverse impact on the adaptive responses (Næss et al. 2005). It is essential to consider bottom-up approach in adaptation (Rouse and Blackett 2011; Bell et al. 2017) as the engagements of community members have positive impact on the adaptation process.

The report of OECD (2010) highlighted that the tourism policies need to focus on local development citing various examples like in the coastal areas (Emilia-Romagna, Italy), mountain areas (Valais in Switzerland), urban regions (the IIe-de-France) or regions having rich natural resources (Quebec in Canada and Arizona in the USA), remote rural areas (Greenland) or in regions where industrial economies

are restructured (Nord Pas-de-Calais, France). The governance systems in tropical constrained environments need to be adaptive to deal with the emerging uncertainties and constraints. In the face of radical uncertainty sustainable adaptation helps in dealing with the vulnerability of communities that suffer from the unfolding pattern of change and helps in coping better with the future. A strategic approach in dealing with the challenges is essential. According to Grotan (2008) adaptation is related to formulating a strategic approach for managing risk, by being resilient which means operating in a 'state of constant preparedness' so as to respond to unpredicted events and surprises. Some strategies are needed for sustainable adaptations by community engagement. It will help in tracing the changes, interrelations and evolution over the years. Hoppe and Coenen (2011) identified a range of factors (size, capacity, presence of a knowledge mix, a local catalyst, etc.) while studying local sustainability in the Netherlands. They opined that regional networks positively influence local sustainability performance.

Olsson (2009) observed regions of Örebro, Hällefors, Karlskoga and Lekeberg in Sweden adaptation to sustainable development and concluded that the freedom should be given to local communities for achieving sustainability step by step at the grassroots. The study conducted by Kusakabe (2013) on Machizukuri (community planning) in Japanese cities highlights that the facilitator approach adopted by local government encourages citizen's ownership of the processes for sustainability. The study conducted by Mell and Sturzaker (2014) of an Indian hilly town, Darjeeling, highlighted the role of governance framework in constrained environment leading to successful adaptation. It is essential to plan the policy carefully as it involves the transformational social change with socio-economic uncertainty. Community adaptation is essential for the planning to be done systematically acknowledging the community attitudes and perceptions (Richards and Hall 2000; Beeton 2006; Reid et al. 2004; Okazaki 2008). According to Anholt (2010), community residents should be empowered through knowledge about their own resources to gain in-depth understanding of their own true core values. The policies need to be planned for equitable development and government has important role in facilitating equitable and inclusive processes and outcomes.

2.2.3 Role of Community Participation

Participation is the involvement of individuals or groups in a decision-making process and it needs to be informed and organized as the people will be going to be affected either positively or negatively by the planned intervention (Andre et al. 2006). Involving community members in each stage of planned intervention is essential. Through participation the stakeholders influence and exercise their control over priority setting, policy making, resource allocations and access to public goods and services (World Bank Group 2005). The question arises that at which stage the community participation should be initiated so as to utilize the capabilities optimally. The studies earlier conducted have shown that the community participation

should be initiated early in the life cycle of planned intervention (Chakraborty and Stratton 1993) and it should be sustained throughout its life cycle. The involvement of the community member right from initial phase develops trust and faith in the agency (Thomas 1998). Early involvement needs to be supported and actively promoted by the government. The participation in planning process improves the quality and effectiveness of decision-making as it creates social support and widens the knowledge base (Pretty et al. 1995; Monnikhof and Edelenbos 2001; Leeuwis 2004; Burby 2003) and helps community members to survive in the constrained environment and enables them to achieve better livelihood. No amount of planning is successful if the communities are not involved in decision-making process as well as in implementation process. High-quality participation contributes positively to effective and legitimate decision-making (Rabe 1994; Stivers 1990) and is deliberative (Ruscio 1996; Stanley 1990). Satisfactory participation leads to development of personal relationships and trust is developed between community and decision makers. Community members become more understanding and tolerant as a result can react in not an adverse way when the decision fails to meet their every concern (Ruscio 1996). Community members who are more attached to their place are more informed and more concerned and thus have stronger views on both positive and negative impacts (McCool and Martin 1994) of any planned initiatives concerning their community.

The implementation of planning is successful if the interdependence of involved parties is recognized (De Bruijn et al. 2002). The study conducted by Schackleton et al. (2002) in Namibia highlights that not involving community members in conservation committees led to conflicts and delays of the planned project. Meaningful community participation leads to successful implementation of the government policies (Arnstein 1969). In a research study conducted in Tanzania, Sen (2000) found that conflicts and poor coordination of efforts of various stakeholders had an adverse impact on the sustainability of the project (McClenaghan 2000.) Lack of proper coordination in community engagement resulted in delay and extension of projects in Jordan and Hong Kong (Al-Momani 2000; Kumaraswamy and Chan 1998). Thus, for effective community engagement the inclusion of conflict prevention and management strategies should be properly inbuilt in the policy framework. Satisfying and deliberative participation motivates people to adopt a more public spirited and tolerant behavior (Warren 1992). In the opinion of Poisner (1996) deliberation is characterized by an open, respectful and thorough discussion in which participants engage in logical discussion on what action serves the common good. It helps in acknowledging and understanding different viewpoints and paves the way for transforming participants in specific ways and this participatory democracy argument is known as the 'self-transformation thesis' (Warren 1992). Involving community members has its own benefits as they are the resource of local traditional knowledge. Traditional knowledge is part of cultural complex that includes language, naming, classification systems, resource use practices, spirituality and world views (ICSU 2002). In the opinion of Katz (2002) local people (community people) manage their common pool resources efficiently, sustainably and equitably (Ostrom 2000). The example

of the city Manizales in Colombia cited by ARUP (2014) supports the participation of community for making the project related to livelihood successful. The local communities were involved to discourage settlements on slopes which posed a threat to people's lives and livelihoods. The members of community were given training to stabilize slopes in their respective locations.

2.2.4 Impact of Community Participation on Tourism

Researchers studying the tourism industry often refer to tourism as a complex business and have devised models and frameworks to address the complexity of tourism as a service activity (Fernando and Long 2012; Anuar et al. 2012). In tourism, community has very essential role to play as the host communities are the basic reason for tourists to travel, to experience the way of life and material products. A study conducted by the Thailand Community Based Institute (2013) describes the concept of tourism as managing and owning local human and natural resources by the community, for the community, with the purpose of enabling visitors to increase their awareness and learn about the community and local ways of life. Community engagement in tourism is essential for sustainable development (UNWTO 2008). It is beneficial for community as well as for tourist industry.

According to Simmons (1994) planning at community level is important if any region desires to deliver tourism experiences ensuring both tourist's satisfaction and ongoing benefits for the residents of destination areas. Choi and Sirakaya (2005) opined that the community is empowered by involving its members in decision-making process. Tourism is beneficial for a community when there is exchange between stakeholders. According to Ap (1992) the sociological theory namely social exchange theory is concerned with understanding the exchange of resources between individuals and groups in an interaction situation. It is also supported in the research studies conducted by Rasoolimanesh et al. (2015) and Biran et al. (2014). Exchanges must exist for a community to improve and stimulate tourism and residents willingly serve the needs of the tourists (Andereck et al. 2005). Based on anticipated costs and benefits incurred community involvement depends and this also includes economic, social, cultural and environmental concerns (Gursoy et al. 2010). The community will support tourism development if the perceived benefits exceed the costs (Andereck et al. 2005; Chuang 2010; Sebele 2010). The community participation is a win- win approach as it enables community to earn livelihood, expands business and helps in the growth of tourist industry as active community participation helps in development of sustainable tourism (Jamal and Getz 1995; Lee 2013).

Involving resident community in the process of development of tourism is challenging and not an easy task as the perceptions need to be understood and the expectations need to be fulfilled. According to Andereck and Nyaupane (2011) it is challenging to understand the perspective of local residents toward the tourist place. People are attached with places emotionally and symbolically (Tuan 1980). In the opinion of Sack (1992) the place where people reside governs people's attitudes,

values and beliefs and thus there exists strong connection between people and place where they reside (Williams and Vaske 2003) and results in their supportive attitude for tourism development (Stylidis and Terzidou 2014). According to Lee (2013), for seeking community support for sustainable tourism it is essential to understand the perceptions and attitudes of residents toward tourism as it will have great impact on their behavior toward the tourists (Getz and Page 2016). According to Hudson (1988) from the local residents perspective a tourist place is commercial center from where they earn their livelihood, for them it is the nest where they raise their family and a social hub where they create social bonding with other community members, for them its significance is not just limited to a holiday destination (Stylidis and Terzidou 2014) and this should be specifically kept in mind before planning any intervention for tourism development in constrained environments.

In tourism, community participation can have positive impact in attracting visitors. Implementation actions require community collaboration and involvement in the development and, operational activities as well as in maintenance as these are the key decisive factors leading to tourist satisfactory experience and optimizing financial performance (Harrison et al. 2003; Kan et al. 2009; Shikida et al. 2010; Moyle et al. 2010). Adaptation of community members toward the expansion of business through tourism-related activities will lead to satisfactory experiences of visitors. Sustainable adaptation and resilience lead to the improvement of social situation as the living conditions of communities improved and also it ensures promotion of domestic and inbound tourism. To make the planned initiatives successful, the community members need to actively participate in the planning process (Byrd et al 2009) and need to be consulted in every stage. The resident community should be the central point in tourism planning process as they are the key stakeholder. It is necessary to recognize the important role of community in the decision-making process. The community perspective should be considered in tourism planning and development (Stylidis and Terzidou 2014) as strong community involvement leads to success of tourism destinations (Getz 1987; Vollero et al. 2018) and toward sustainable adaptation of communities and promotion of business in the changing environment. Hence the above discussions can be better understood through the following proposed framework (refer to Fig. 2.2).

The strategic framework model proposed above, highlights the process for achieving the goal of sustainable development of the communities. The model suggests that community participation will be helpful in effective policy planning, decision-making, implementation, monitoring and evaluating the policies leading to sustainable development of tourism. These steps require significant inputs of knowledge exchange and experience sharing of the community members. The outcome of the policy framework needs to be aligned to the challenges and streamline the developmental process by initiating protective action to maintain the consistency of actions with the set objectives. The effective community participation is assessed by the variables like access, equity, transparency, accountability and regulations. The vulnerabilities and challenges need to be aligned with the outcome to ensure the achievement of the goal. The output of the model highlights the achievement of the goal

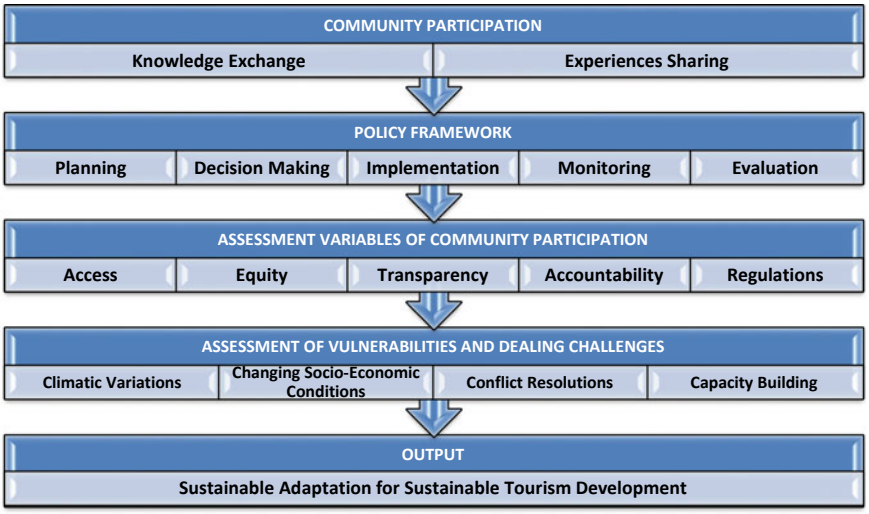

Fig. 2.2 Strategic framework model

i.e., sustainable adaptation of communities in constrained environment for sustainable tourism development. It is necessary to follow structured approach in planning and implementing adaptation strategies, policies and measures for sustainable development. Gradual planned approach during the initial phases helps in reducing vulnerability and chaos.

2.2.5 Community Participation: Engaging Local Community in Adaptation Process

For the community engagement, it is essential to invest in social mobilization along with financial and technical investments. If people are not involved, then they will remain silent spectators and will not get engaged as participators resulting in poor experiences of tourists. The community members have the right to be informed about actions that affect their lives and they need to be proactively involved in a meaningful way. The model highlights the role of community participation as an integrative and comprehensive approach for community adaptation in the process of tourism development. It focuses on strengthening the engagement of community members as planners and decision makers. The community members need to be involved in decision-making related to priority settings, city layout, infrastructure, amenities, services, etc., facilitating their engagement in the adaptation process. Engagement of community members in the model implies commitment to the adaptation process leading to decisions and resulting in actions. The community members' knowledge and experiences should be leveraged in the identification, planning, development and

implementation of relevant solutions. In order to achieve sustainability goals ignoring local knowledge, experiences or social components of community and introducing any plan or new approach will not be acceptable by the community members so it is necessary to involve them right from the starting phase thus leading to successful implementation of the planned projects. Community consultation leads to sustainable decisions as these decisions are based on local knowledge, experiences, concerns and preferences and the project outcomes are socially accepted. To integrate the experiences and knowledge of local community it is essential to involve them actively and in a meaningful way in the process of planning and implementing adaptation activities. This will maximize the impact of tourism at the local destination area as well as community residents will be recognized as an essential ingredient in the 'hospitality atmosphere' of a destination (Simmons 1994).

The proposed model suggests that the adaptations of communities in resource-constrained environments in the tropics and subtropics should be done by developing a policy framework guided by community members. The integration of community in the policy framework is essential ensuring both tourist's satisfaction and benefits for the residents. The policy framework consists of stages viz. planning, decision-making, implementation, monitoring and evaluation. Community participation is essential in all these stages. The planning process should encourage the community members to view the adaptive process as integrative and it should facilitate the knowledge exchange to promote integrated and coherent solutions for the challenges. It is necessary for community members to express their views and give opinions during priority setting and negotiating with the agencies involved for sustainable development in their area. The community members should participate in formulating objectives and setting goals. By getting involved in the monitoring and evaluating stages of policy framework the community members recognize the improvements that can be made and as changes take place the needs should be redefined. The community participation should be carefully planned and adjusted to specific destinations, communities and circumstances (Shani and Pizam 2012).

The involvement of community in the project makes them accountable and facilitates their engagement in implementation, monitoring and evaluation. Behailu et al. (2016) highlighted community participation in Ethiopia which posits that engagement is essential in the sustainable development process. Community involvement increases the effectiveness and efficiency of planning and ensures successful implementation resulting in achievement of the desired goal as the community members see the plan as their own and work toward successful achievement of the set goals. The policy framework should be aligned to the needs of the community to ensure successful completion and also the clarity regarding the responsibility, accountability and sharing of benefits needs to be specifically mentioned. The effective community participation needs to be assessed by the variables like access and equity, transparency, accountability (Waddington et al. 2019) and regulations. Here access and equity refers to the fair distribution and allocation of resources, work or benefits among members of community; transparency and accountability is essential to make community members answerable to their action and behavior as well as responsive toward accomplishment of goals; regulations means the existence of laws, rules and

policies to regulate community members. The identified assessment variables will be having direct impact on the effectiveness of the outcome and are indispensable for sustainable adaptation of the communities.

2.2.6 Assessment of Vulnerabilities and Dealing Challenges for Adaptation

Any natural or social system has limited capacities to adapt. The vulnerability includes climatic variations and changing socio-economic conditions. The communities are exposed to frequent climatic variation which also results in abrupt changes in their socio-economic conditions. Any change in their existing condition has interconnected effects on the entire community. It is common for community members to resist change as people are loyal to their traditional way of life but resilient communities instead of being feeling helpless, reorganize the roles of its members and focuses on building a new equilibrium. The attempt should be made to enhance democratic, egalitarian leadership with negotiations from all its members. It is challenging to change the community thinking to a new paradigm so gradual change and systematic approaches are required for community engagement in the change process. Lack of coordinated governance and conflicting objectives can have an adverse impact on the adaptation leading to maladaptive social patterns. Therefore, managing and resolving conflicts are essential. Lack of skills among community members can be challenging as it can have an adverse impact on tourism activities. Training needs to be provided to enhance communication, marketing, financial and hospitality skills. It is essential to invest in capacity building to develop skills and confidence of community members.

The output of the proposed model highlights the achievement of the goal i.e., sustainable adaptation of communities in constrained environment for sustainable tourism development. It is also expected that community members should understand their responsibility in adapting process. The adaptation process must allow sufficient time for community members to review and provide feedback. Community adaptation requires the mobilization of collective action with proper communication among the stakeholders to implement planned, integrated and coherent initiatives which are sustainable, efficient and equitable (Aref 2011) In order to support community initiatives in resource-constrained contexts there is need for considering wide range of options for adaptation by enhancing the interactions with community members so as to augment reciprocal trust and thus reducing the risk of policy implementation failure. The suggested model highlights recommendations for sustainable adaptations and resilience of communities in tropical constrained environments for promoting tourism. It provides a conceptual framework to explain survival of communities based on tourism sector in constrained environments. It will be helpful for researchers, policy makers and tourism industry.

2.3 Conclusion

Many communities are struggling in tropical constrained environments to conserve, restore and enhance their natural habitat areas. The specific focus should be on the fulfillment of the economical need and safety of the people without disturbing their natural habitat. The balance should be between the investment made and the adaptation of the communities. Active local community participation is necessary in tourism development for achieving the goals of sustainability as well as for the welfare of local community (Ertuna and Kirbas 2012).

Participation does not simply mean being involved in the implementation process but it means contributing ideas, opinions, suggestions, making decisions and being accountable for one's action and behavior. It is essential to understand the dynamics of community participation processes for successful adaptation. Adaptation policies and measures are best assessed in a developmental context. The policy planning, implementation and enforcement should involve the decision of community members. There are various advantages of community participation like the knowledge of local resources is available with the community members. The fact that community members have considerable knowledge, skills and empathy is often overlooked in the process of commercialization of a destination area which affects the sustainable development of tourism. For the success of tourism projects, the local community involvement is essential (Breugel 2013). In the contemporary context of growing complexity and rapid change it is necessary to plan strategically for sustainable development in tropical constrained environment. Community participation motivates people to work together and the members recognize the benefits of their involvement in the project as they get benefitted economically. The projects which have actively involved cohesive community groups have greater success rate. Community participation contributes to the effectiveness, efficiency and sustainability of planned tourism projects.

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Chapter 3
Resource-Conserving Entrepreneurial Behaviour of Micro-Entrepreneurs: Evidence from a Tanzanian Community

Emiel L. Eijdenberg and Felix Ostertag

Abstract To conserve the planet for current and future generations, researchers in entrepreneurship have focused increasingly on pro-environmental entrepreneurial behaviour. However, in tropical constrained environments, factors underlying pro-environmental entrepreneurial behaviour (for example, resource conservation, as considered in this study) have been largely understudied. Against this background, this chapter examines a prototypical sample of 140 micro-entrepreneurs (food vendors, in this case) in Iringa, a city in the Southern Highlands region of Tanzania. The analyses show that resource-conserving entrepreneurial behaviours and actions depend on entrepreneurial competencies and the micro-entrepreneurs' attitudes towards resource conservation, the latter of which is, in turn, crucially contingent upon the entrepreneurs' educational background. Apart from the theoretical implications that can be drawn from the granular findings, on a broader level, this study contributes to a much-needed deeper contextualisation of entrepreneurship as a research field. Several practical implications, revolving around reconsidered education and training young generations, are presented in the concluding discussion.

Keywords Africa · Contextualisation · Entrepreneurship · Small business owners · Sustainability · Tropics

3.1 Entrepreneurs as Vehicles of Sustainable Development in Tropical Constrained Environments

The field of entrepreneurship answers the questions of how, when, and with what effects opportunities emerge for the creation of goods and services. Entrepreneurs

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are individuals who discover, evaluate, and exploit these opportunities (Shane and Venkataraman 2000; Venkataraman 1997). These aspects revolve around the starting up and running of a small business. Such a small business can be anything, from a mobile app-based solution to first mile or last mile problems created by a college student in Western Europe to a middle-aged micro-entrepreneur[1] (e.g., Honig 1998), in this case a food vendor, selling *ugali* in the tropical constrained environment[2] of Tanzania. Entrepreneurship as such is considered a driver of sustainable development; it is one way of striving for greater human well-being and broad social goals (Dean and McMullen 2007; Pacheco et al. 2010; Parrish 2010).

Entrepreneurial behaviours are expected to contribute to solving environmental problems through, for example, many renewable energy solutions, such as solar water heating and waste degradation (Gabriel 2016; Gabriel and Kirkwood 2016). Especially in tropical constrained environments, entrepreneurs can tackle issues such as conservation of agricultural landscapes, integrated natural resource management, management of biodiversity loss (Barau et al. 2016) and recycling behaviour (Ramayah et al. 2012). Moreover, there has been much discussion surrounding the education and entrepreneurial competencies (i.e., personality traits, skills, and knowledge) needed to achieve environmental sustainability in tropical constrained environments (e.g., Kola-Olusanya 2013; Lans et al. 2014; Wiek et al. 2011). Considering micro-entrepreneurs in tropical constrained environments, we assume that education helps one critically reflect on the environmental issues of such an entrepreneur's daily realities and promotes pro-environmental attitudes with respect to resource conservation. These attitudes in turn encourage the development of pro-environmental entrepreneurial behaviours, especially when they are facilitated by entrepreneurial competencies. Despite the fact that Ajzen's (1991) theory of planned behaviour partially elaborates on such dependencies, little effort has been made to empirically test these relationships in a tropical constrained environment with methods catered to this specific context. Hence, our study provides a clear-cut contribution to fill this gap.

Entrepreneurial competencies are often learned and developed through education, a key institution in tropical constrained environments for enhancing entrepreneurial activities (Batana 2013; Eijdenberg 2016; Eijdenberg and Borner 2017; Naudé et al. 2008; Ramachandran and Shah 1999). This implies that education and entrepreneurial competencies surrounding pro-environmental entrepreneurial behaviour may help entrepreneurs in tropical constrained environments prevent the negative effects, for example, of natural disasters, climate change, or social instability through the development of their competencies. The aim of this chapter is to analyse the effects of education, entrepreneurial competencies, and attitudes towards

[1]The terms 'entrepreneur' and 'micro-entrepreneur' are used interchangeably. However, in view of the type of individuals studied in this chapter, we refer to 'micro-entrepreneurs'.

[2]Tropical constrained environments are defined as unique territories characterised by challenging man-made circumstances or limited natural resources in the world's tropical regions (i.e., delimited in latitude by the Northern Hemisphere at 23°26'12.1" N and in the Southern Hemisphere at 23°26'12.1"). Tanzania, like many other developing countries, is within this geographical zone that is sometimes referred to as the 'Global South'.

resource conservation on the resource-conserving[3] entrepreneurial behaviour of micro-entrepreneurs (in this case, food vendors) in a tropical constrained environment: Iringa, a Tanzanian city. By doing so, the following research question will be answered: *How do education, entrepreneurial competencies, and attitudes towards resource conservation affect the pro-environmental entrepreneurial behaviour of micro-entrepreneurs?* The data were self-collected. In the remainder of this chapter, we will first discuss the relevant literature. Thereafter, we will provide an outline of the methods. In this section, the most relevant details about the micro-entrepreneurs in Iringa will be discussed. The methods section is followed by the results. The chapter closes with a concluding discussion.

3.2 Micro-Entrepreneurs' Contributions to Sustainability in Tropical Constrained Environments

3.2.1 Education and Attitudes Towards Resource Conservation

The achievement of environmental sustainability seems essential because, in comparison to non-tropical and wealthier environments, tropical constrained environments depend to a greater extent on natural resources, especially renewables (Goodland 1995). In addition, tropical environments are more vulnerable to negative climate change impacts (Blasiak et al. 2017; Miyan 2015; Serdeczny et al. 2017). The human population in these regions is growing rapidly, and the quality and quantity of natural resources are thus declining (United Nations Environment Programme 2006). Communities in tropical constrained environments crucially depend on well-functioning natural ecosystems such as water resources and various forest products, and their members rely heavily on agriculture (Vlek and Steg 2007; Webersik and Wilson 2009) to make a living.

In such environments, micro-entrepreneurs largely form the economic backbone of these communities and serve to alleviate poverty (Fjeldstad et al. 2006). The literature often differentiates between opportunity-driven and necessity-driven entrepreneurs, the latter having no other or better option than self-employment (Acs 2006; Amit and Muller 1995; Francoise et al. 2016; Reynolds et al. 2005). In tropical constrained environments, many entrepreneurs are necessity-driven and are often motivated by the need for subsistence due to the extreme levels of poverty (Eijdenberg et al. 2020; Wennekers et al. 2005). These entrepreneurs start and run the typical

[3] Occupational or workplace-related behaviours can be distinguished into several pro-environmental domains (Ones and Dilchert 2012), all of which constitute human actions that are either directly or indirectly protecting natural resources or at least reducing environmental deterioration (Hahn and Ostertag 2018; Juárez-Nájera et al. 2010). In the context of entrepreneurial behaviours, this chapter focuses on resource conservation as a particular domain of pro-environmental entrepreneurial behaviours.

micro-businesses (Francoise et al. 2016), and they can be found abundantly working as food vendors in tropical constrained environments (Choongo et al. 2020; Eijdenberg and Thompson 2020). Whereas higher education leads to more opportunity-driven entrepreneurs (Eijdenberg et al. 2020), we can assume that necessity-driven entrepreneurs usually have little or no formal education. The long-term survival of each micro-business is jeopardised by the owner's lack of access to high-quality education that could provide knowledge about issues related to the environment and other crucial factors.

In general, education has previously proven to be a crucial institution for entrepreneurship in tropical constrained environments (Batana 2013; Brixiová et al. 2015; Eijdenberg 2016; Eijdenberg and Borner 2017; Naudé et al. 2008; Ramachandran and Shah 1999), and it is probably the most important factor in predicting entrepreneurs' attitudes towards the environment (Ploum et al. 2018; Vicente-Molina et al. 2013). A relatively low level of education, including only the knowledge of reading and writing, leads to slower adaptions to environmental changes and thus weakens the productivity of entrepreneurs' businesses. An explanation for the latter is the lack of higher education that trains the mind and eases adaptation to external changes (e.g., new technologies) (Tsambou and 1er Ndokang Esone 2016). 'The longer the education, the more extensive is the knowledge about environmental issues' (Kollmuss and Agyeman 2002). Access to information, ongoing education on environmental issues, and the development of knowledge is, therefore, essential to behaving pro-environmentally and managing the environment effectively (Hahn and Ostertag 2018; United Nations Environment Programme 2006).

Several empirical studies indicate that a higher educational background influences pro-environmental, or 'resource-conserving', behaviour, such as recycling, in particular (e.g., Chen et al. 2011; Johnson et al. 2004; Thøgersen and Ölander 2006). However, education does not ultimately lead to increased pro-environmental behaviour; it is rather assumed to affect behaviour indirectly via attitudes. As such, education can be considered the personal foundation of an individual's concern for and attitude towards the environment (see a recent review by Gifford and Nilsson 2014). Through education, individuals—including micro-entrepreneurs—learn about and accumulate knowledge (at an early age) of how to treat the ecological environment in the best possible way. Given this backdrop, we hypothesise the following:

Hypothesis 1 (H1) Micro-entrepreneurs' education positively affects their attitudes towards resource conservation in a tropical constrained environment.

3.2.2 Resource-Conserving Entrepreneurial Behaviour and Entrepreneurial Competencies

Taking a general psychological point of view, people's positive attitudes towards resource conservation determine concurrent behaviour in tropical constrained environments (Fiallo and Jacobson 1995; Sekhar 2003; Teye et al. 2002). This also

applies for entrepreneurs (Testa et al. 2016). Through their attitudes towards resource conservation, entrepreneurs could help mitigate the negative impacts on the natural environment via *pro-environmental entrepreneurial behaviours* (Bagire et al. 2011; Dean and McMullen 2007; Roxas et al. 2017). Examples of the pro-environmental entrepreneurial behaviours of micro-entrepreneurs in tropical constrained environments include reusing plastics to make mattresses, raising customer's knowledge of and awareness for resource conservation, promoting the use of organic products, recycling car tires for sandals, various types of community garbage collection, reduction of food waste, reduction of offcuts and water conservation (see, e.g., Eijdenberg 2019; Eijdenberg and Thompson 2020).

The 'attitudes–behaviour' relationship can work as an upward spiral for resource conservation within and beyond the community if successful micro-entrepreneurs act pro-environmentally (Abrahamse and Steg 2013; D'Souza et al. 2019; Franklin and Dunkley 2017). Especially in kinship cultures like in many tropical constrained environments, the disseminated impact from the micro-entrepreneur is pivotal as it elevates the quality of life and well-being of the broader community (George et al. 2016; Verver and Koning 2018). Everything considered, we hypothesise:

Hypothesis 2 (H2): Micro-entrepreneurs' positive attitudes towards resource conservation positively affect resource-conserving behaviour in a tropical constrained environment.

Entrepreneurial competencies are often major catalysts of certain behaviours. According to Man et al. (2002), entrepreneurial competencies are viewed as 'the total ability of the entrepreneur to perform a job role successfully'. Entrepreneurs need certain competencies to identify sustainable development as an opportunity for a business that embraces, for example, environmental goals (Lans et al. 2014; Ploum et al. 2018). This opportunity recognition competency is foundational to entrepreneurial competencies (DeTienne and Chandler 2004; Lans et al. 2014; Shane and Venkataraman 2000). The recognition of opportunities encourages entrepreneurs to start a business and possibly to turn risks into a favourable outcomes (Ahmad et al. 2010). DeTienne and Chandler (2004) report that the development of opportunity recognition competencies stems from tailored education, and, in addition, leads to the recognition of more opportunities, including increased innovativeness (i.e., a positive spiral).

Research on important entrepreneurial competencies addresses high failure rates, especially among micro-entrepreneurs in tropical constrained environments (Ahmad et al. 2010; Urban and Naidoo 2012). Similarly, the second African Environment Outlook reports that the absence of entrepreneurial competencies is seen as a reason for unsuccessful sustainable development. Consequently, the empowerment of entrepreneurs via the acquisition of important competencies is essential (United Nations Environment Programme 2006). Moreover, Urban and Naidoo (2012) found a positive correlation between the operational skills of entrepreneurs and the sustainability of their businesses. Against this background of previous research, we hypothesise:

Hypothesis 3 (H3): Micro-entrepreneurs' entrepreneurial competencies, as catalysts of positive attitudes towards resource conservation, positively affect resource-conserving entrepreneurial behaviour in a tropical constrained environment.

3.3 Methods

3.3.1 Context of the Study

The data collection took place in Iringa, a Tanzanian city. Tanzania is an East African country of 947 thousand square kilometres with about 57 million inhabitants, and it is classified as a typical tropical constrained environment. Apart from some British, Dutch, and French overseas territories, the only high-income, developed tropical environments are Hong Kong, Singapore, and parts of Taiwan and Australia. All other tropical environments are rather resource constrained due to the critical factors of limited coastal proximity (i.e., many tropical countries are landlocked), high prevalence of infectious diseases, and generally low agricultural productivity (Sachs et al. 2001).

Tanzania hosts Africa's highest point, Mount Kilimanjaro, and has a tropical climate with regional variations due to topography. Although relatively rich in minerals such as diamond, gold, iron, and tanzanite, the country suffers from massive unskilled human capital. People are unable to efficiently exploit the natural resources for their own interest and that of others. In addition, although the availability of minerals may be abundant, the conditions that allow for large-scale economic development from other natural resources (e.g., agriculture, fishery, and timber) are scarce (United Nations 2019). Yet, like other developing countries in the region, Tanzania's economy and its population have grown rapidly in the last decade. Tanzania faces challenges regarding urbanisation because unemployment in urban areas is high, and there is a significant lack of basic infrastructure (e.g., roads, housing, electricity and water) to support the people who work and live in the city. Tanzania's rapidly growing population has led to soil degradation, deforestation, desertification, and threatened wildlife.

The region of Iringa is located in the Southern Highlands region of the Tanzania Mainland. Agriculture, especially the sale of food produced from the local crop fields, is the dominant economic sector in the region (Tanzania National Bureau of Statistics 2013). Positive attitudes towards environmental conservation and pro-environmental entrepreneurial behaviour are essential due to Tanzania's high dependency on natural resources and its large, growing population (United Nations Development Programme 2019).

3.3.2 Data Collection

Following the so-called 'qual → QUAN' research design (i.e., a qualitative pre-study justifying a quantitative main study) (Molina-Azorín et al. 2012), the data began with a workshop as the pre-study. This workshop, a capacity-building training for 15 faculty members (i.e., the workshop participants) of the University of Iringa (UoI), was held by the first author of this chapter—in collaboration with others—in October 2016. The workshop participants were all middle-aged or older, had diverse educational backgrounds and held various middle and advanced positions at the UoI. All workshop participants had lived long term in the Iringa region and were heavily involved in its economic development, which included entrepreneurship training and incubation programs. All these factors enabled them to gain the necessary research experience to develop questionnaires on entrepreneurship-related topics relevant to their context. This type of qualitative pre-study organisation is often applied as a legitimising tool for the development of questionnaires in tropical constrained environments (cf. Eijdenberg et al. 2019; Eijdenberg and van Montfort 2017).

The workshop's theme was the development of entrepreneurship curricula and research at the UoI. By providing insights on battery items validated in the Western hemisphere, in this workshop, the participants were first asked to adapt the existing items for education, attitudes towards environmental conservation, pro-environmental entrepreneurial behaviour and entrepreneurial competencies in such a way that they would fit the boundary conditions of tropical constrained environments. After a number of focus group discussions to settle for the most applicable operationalisations, the ultimate questionnaire was established in agreement with all workshop participants. Regarding the final questionnaire, it is important to note that the workshop participants suggested including the education item as part of other socio-demographic factors such as age and gender. In previous studies and reviews, both age and gender have been found to be significantly related to pro-environmental behaviour in general and to resource conservation in particular (see, e.g., Whitmarsh and O'Neill 2010; Wiernik et al. 2013; Zelezny et al. 2000). The final questionnaire was translated into Kiswahili, the official language in Tanzania, to prevent misunderstandings or misinterpretations by the respondents. Refer to Table 3.1 for the final questionnaire.

After the pre-study, the final questionnaire was administered to micro-entrepreneurs in Iringa (i.e., the main study). The workshop participants were the data collectors. Following the threshold of $N > 50 + 8\,m$ (i.e., m represents the number of predictors in the regression model) for sample size (Tabachnick et al. 2007), the data collection resulted in 140 fully completed questionnaires by micro-entrepreneurs. The micro-entrepreneurs were selected based on the 'random walk' sampling procedure (Frese et al. 2007), which is common practice in tropical constrained environments. As discussed earlier, the micro-entrepreneurs were food vendors—the so-called 'mama lishe'—because they represent typical founders and owner-managers of micro-businesses in this region (Eijdenberg 2016; Eijdenberg et al. 2020). They

Table 3.1 Final questionnaire items

Item number	Item abbreviation	Item description	Scale
Socio-demographics			
1	Age	Age	–
2	Gender	Gender	0 = Male; 1 = Female
3	Education	Highest completed level of education	1 = Primary school; 2 = Secondary school; 3 = Vocational school; 4 = Tertiary school
Attitude towards resource conservation (during the value creation process)			
4	AttEnvCon_01	I contribute financially to the services for them [e.g., fellow community members] to collect garbage from my work area†	1 = Strongly disagree; 2 = Disagree; 3 = Not sure; 4 = Agree; 5 = Strongly agree
5	AttEnvCon_02	I am aware that my business pollutes the environment	
6	AttEnvCon_03	I use old car tires to create useful products, such as spare parts and shoes	
7	AttEnvCon_04	I reuse materials—for example, plastic bags—within my business	
Resource-conserving entrepreneurial behaviour			
8	EnvEntBeh_01	The resources for the products I sell are made from recycled materials	1 = Strongly disagree; 2 = Disagree; 3 = Not sure; 4 = Agree; 5 = Strongly agree
9	EnvEntBeh_02	I sell recycled products	
Entrepreneurial competencies			
10	EntComp_01	I am not pleased once my goals are not met*	1 = Strongly disagree; 2 = Disagree; 3 = Not sure; 4 = Agree; 5 = Strongly agree
11	EntComp_02	No matter how much initiative I make, it is not the determinant of success [reverse item]	
12	EntComp_03	Even if I am fully occupied in my business, I can still attend other things which come up*	
13	EntComp_04	I do not have time to think about what I get and the time I spend before doing the business works [reverse item]	
14	EntComp_05	I do not bother to imitate what others are doing; I use my own ways of running the business	

Note *Items marked with an asterisk have been excluded from the reliability and regression analysis; †For clarification purposes, item AttEnvCon_01 has a high degree of local contextualisation and is consequently worded to the community-level understanding. It should probably be understood as 'I contribute financially to services that collect garbage from my work area'

prepare no-frills local dishes and sell them mainly to workers in restaurants or to people on the street. The mama lishes often source their produce from their own fields. To reach their clients, mama lishes organise themselves in self-built premises close to construction sites, transportation hubs (Iringa is geographically perfect in this regard, connecting north and south Tanzania) and commercial/industrial areas in city centres. The sample included 84 women and 56 men. The average age was 33.6 years, with the youngest micro-entrepreneur being 15 and the oldest being 53 years old. Most of the micro-entrepreneurs had a low level of education; 53.6% had completed primary school as their highest level of education, followed by 36.4% having completed secondary school and 10% having completed another type of education. We conducted several regression analyses to test our hypotheses.

3.4 Results

3.4.1 Descriptive, Correlation, Factor and Reliability Analyses

Table 3.2 shows the Pearson correlations of all relevant items for the regression analyses.

As the positive and significant correlations in Table 3.2 indicate, the four items that assessed the micro-entrepreneurs' attitudes towards resource conservation formed a unidimensional factor and a composite construct (Cronbach's $\alpha = .61$) that reflects internal consistency and moderate reliability (Robinson et al. 1991). Although we incorporated the expertise of locals for our scale development, we were unable to extract a unidimensional factor from our initial five competency measures, which may point to a rather multidimensional nature of entrepreneurial competencies in general. Consequently, we relied on three fairly highly correlated items for our entrepreneurial competencies measure (Cronbach's $\alpha = .55$). These items were considered to capture the essence of such competencies in general, and they reflect a level of reliability that can be referred to as sufficient and acceptable (cf. Taber 2018). Finally, the two output-oriented items ('The resources for the products I sell are made from recycled materials' and 'I sell recycled products') were significantly interrelated and thus used as a composite index for resource-conserving entrepreneurial behaviour.

3.4.2 Regression Analyses

We calculated several regressions (three models) to test our hypotheses. Model 1 tests the effects of socio-demographic variables on the micro-entrepreneurs' attitudes towards resource conservation. The results are shown in Table 3.3.

Table 3.2 Correlation table: Means, standard deviations (*SD*) and Pearson correlation coefficients (*r*-values)

	Age	Gender	Education	AttEnv Con_01	AttEnv Con_02	AttEnv Con_03	AttEnv Con_04	EntComp_02	EntComp_04	EntComp_05	EnvEntBeh_01	EnvEntBeh_02
Mean	33.59	.60	1.62	3.76	3.64	2.22	2.68	2.93	3.27	3.30	2.25	2.15
SD	7.93	.49	.82	1.48	1.50	1.40	1.54	1.36	1.40	1.45	1.44	1.39
Age	1											
Gender	.06	1										
Education	−.20*	−.15	1									
AttEnvCon_01	−.01	−.12	.20*	1								
AttEnvCon_02	.08	.16	−.03	.17*	1							
AttEnvCon_03	−.11	−.06	.12	.38**	.22**	1						
AttEnvCon_04	−.10	−.19*	.15	.28**	.23**	.41**	1					
EntComp_02	−.02	.00	.13	−.05	.16	−.23**	−.01	1				
EntComp_04	.14	.03	.01	−.08	.11	−.35**	−.05	.36**	1			
EntComp_05	−.12	.09	−.05	.00	.01	.12	.11	.27**	.24**	1		
EnvEntBeh_01	−.12	−.07	.12	.28**	.01	.49**	.50**	−.25**	−.42**	.13	1	
EnvEntBeh_02	−.04	−.12	.16	.23**	.08	.38**	.41**	−.14	−.24**	.07	.69**	1

Note $N = 140$; *Correlation is significant at the .05 level (2-tailed); **Correlation is significant at the .01 level (2-tailed); Items are only shown if used for the regression analyses

Table 3.3 Regression model for attitudes towards resource conservation

		Model 1					
Dependent variable: Attitudes towards resource conservation							
		Regression coefficient	*SD*	β	t-value	Tolerance value	VIF
Constant		2.923	*.46*		6.389		
Control variables							
	Age	−.002	*.01*	−.020	−.228	.96	1.04
	Gender	−.113	*.18*	−.055	−.646	.98	1.02
Independent variables							
	Education	.186	*.11*	.151†	1.738	.94	1.06
	R^2	.030					
	Adjusted R^2	.009					
	F(df)	*1.404*(3,136)					

Note ***$p < .001$; ** $p < .01$; * $p < .05$; † $p < .1$

The data in Table 3.3 reveal that, unlike other socio-demographics, education is a positive predictor of attitudes towards resource conservation ($\beta = .151$, $p < .10$). Hence, *H1* is supported.

In Model 2, resource-conserving entrepreneurial behaviour is inserted as the dependent variable, followed by age and gender as the controls, and education and attitudes towards resource conservation as the independent variables. In addition to Model 2, Model 3 adds entrepreneurial competencies as a further determinant of micro-entrepreneurs' resource-conserving behaviour. Models 2 and 3 are presented in Table 3.4.

The data in Table 3.4 reveal that attitudes towards resource conservation (Model 2: $\beta = .456$, $p < .001$; Model 3: $\beta = .415$, $p < .001$) and entrepreneurial competencies (Model 3: $\beta = .317$, $p < .001$) are strong positive predictors of micro-entrepreneurs' pro-environmental behaviour. Overall, *H2* and *H3* are both supported.

3.5 Concluding Discussion

Based on the analyses, the answer to the research question is that education is a positive predictor of attitudes towards environmental conservation (i.e., *H1*). Moreover, attitudes towards environmental conservation positively determine pro-environmental entrepreneurial behaviour (i.e., *H2*). Finally, entrepreneurial competencies indeed facilitate positive attitudes towards environmental conservation in determining the pro-environmental entrepreneurial behaviour of micro-entrepreneurs (i.e., *H3*).

Table 3.4 Regression models for resource-conserving entrepreneurial behaviour

		Model 2							Model 3					
Dependent variable: Resource-conserving entrepreneurial behaviour														
		Reg. coeff.	*SD*	β	t-value	Tolerance value	VIF		Reg. coeff.	*SD*	β	t-value	Tolerance value	VIF
Constant		.577	*.60*		.962				−.553	*.62*		−.894		
Control variables														
	Age	−.008	*.01*	−.046	−.603	.96	1.04		−.002	*.01*	−.009	−.127	.95	1.06
	Gender	−.151	*.20*	−.057	−.749	.97	1.03		−.130	*.19*	−.049	−.691	.97	1.03
Independent variables														
	Education	.097	*.12*	.061	.783	.92	1.08		.150	*.12*	.095	1.282	.91	1.10
	Attitudes towards environmental conservation	.589	*.10*	.456***	5.968	.97	1.03		.535	*.09*	.415***	5.735	.95	1.05
	Entrepreneurial competencies								.349	*.08*	.317***	4.414	.97	1.04
	R^2	.235							.332					
	Adjusted R^2	.212							.307					
	ΔR^2 (Model 2)	–							.097***					
	F(df)	*10.377*(4,135)							*13.335*(5,134)					

Note ***$p < .001$; **$p < .01$; *$p < .05$; † $p < .1$

Our study untangles education, attitudes towards resource conservation, entrepreneurial competencies, and resource-conserving entrepreneurial behaviour by zooming in on a prototypical sample of micro-entrepreneurs in Tanzania: the mama lishes. This type of food-vending entrepreneur is found abundantly in tropical constrained environments, especially in developing countries on the African continent. These findings add value to the literature not only at the broad level of expanding research on entrepreneurship contextualisation (Eijdenberg and Thompson 2020; Smallbone et al. 2014; Welter 2011; Welter et al. 2019), but also at the granular level. This added value is particularly found in Tables 3.2–3.4, which cover *how* and *to what extent* the education, pro-environmental attitudes, entrepreneurial competencies, and pro-environmental entrepreneurial behaviour of micro-entrepreneurs are understood, exercised, and eventually associated. Most previous research has studied these items separately, in different compositions and using different units of analyses (e.g., employees, managers) or in different contexts (e.g., non-tropical or non-constrained environments) (Braun 2010; Price and Leviston 2014; Vicente-Molina et al. 2013).

The results of this chapter are subject to limitations, which point towards potential future research avenues. First, the study is limited in its context. Future researchers are encouraged to study different tropical constrained environments around the globe (e.g., Cambodia, Haiti, Honduras, or Kiribati). In addition, tropical environments that are less constrained in terms of their economic, social, and natural resources will likely yield different results. For example, a developed tropical country such as Singapore relies on a highly educated, innovation-driven and skilful workforce, including entrepreneurs. Hence, all of the studied items would most likely be developed very differently in that setting.

Furthermore, this study is limited in its research design. Future researchers are encouraged to use different research methodologies (e.g., solely qualitative interviews, focus groups or experiments) in order to overcome this study's limitations surrounding concealed, underlying factors that were not captured by the questionnaire. Future researchers could expand on the results of this study by using different types of samples, such as by studying formal, innovative businesses using a larger sample (e.g., consultancy firms, hardware stores, mobile phone application developers).

An important note should be made concerning the concepts of attitudes towards resource conservation and entrepreneurial competencies. Both concepts remain difficult to measure in tropical constrained environments because the well-established measurements gleaned from empirical studies conducted in industrialised countries likely do not fit the realities of tropical constrained environments. Moreover, the approach taken in our study—that is, reliance on self-developed measures from a focus group that consisted of participants from such environments—also resulted in some methodological issues. In particular, the complexity of these concepts may be hard to understand, especially for individuals in developing countries in the tropics, who often suffer from a lack of access to high-quality educational institutions. Therefore, the items designed to capture these two concepts (i.e., attitudes towards resource

conservation and entrepreneurial competencies) should be revised, and reversely formulated items should be avoided to reduce complexity.

Finally, based on the findings, several practical implications can also be drawn. Tropical constrained environments need entrepreneurs who can discover or create opportunities for sustainable development to stabilise their environments economically, ecologically, and socially. The negative impacts of environmental degradation could be explained in schools in order to convey an understanding of the importance of the environment while students are young (Umoh 2010). If crucial concepts are taught in primary and secondary school, precious contributions are made to the early development of knowledge and solution-oriented thinking. Because much environmental degradation is irreversible, tropical constrained environments would benefit from a preventative approach that prioritises and expedites pro-environmental education and, in so doing, prevents expensive corrective actions (Goodland 1995). Additionally, academic programs should be created or tailored to train and educate future entrepreneurs, encouraging students to plan, lead, and engage in sustainability research (Wiek et al. 2011).

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Chapter 4
Case Study Approach in Tackling Environmental, Physical and Social Sustainability in Bangkok

Elmira Jamei, Hing-Wah Chau, and Kitapatr Dhabhalabutr

Abstract Bangkok, the capital of Thailand, is one of the megacities in Asia, with an estimated population exceeding 60 million people. This chapter provides an overview of the main challenges that planners encounter to address the sustainable development objectives in Bangkok. These challenges are listed as follows. (1) Climate change has been the main drive for stakeholders and municipalities to propose a strategic framework, which can reduce CO_2 emissions and increased urban air temperature. These actions consider the existing city infrastructure and the need for community involvement. (2) The economic development and productivity of Bangkok are adversely affected by traffic congestion and poor connectivity in the urban fabric. (3) Poverty, social inclusion and the growing number of slums in Bangkok, accounting for almost one-quarter of the city's total population. Adopting a case study approach this study reviews the strategies municipalities tackled the above-mentioned challenges considering environmental (climate change), physical (transportation and street systems) and social (slum access to housing) sustainability. This chapter also provides an insight into the planning actions that can be considered to meet sustainable development goals.

Keywords Sustainability · Urban Planning · Climate Change · Transportation · Street Life · Slum Housing

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4.1 Environmental Sustainability (Focus: Climate Change and Green Infrastructure)

Today, cities host more than half the world population, and this number is expected to increase by 70% and reach 6.4 billion people by 2050. Asian tropical cities will experience more than 60% of this increase, half of which will occur in cities with less than 500,000 urban dwellers. Owing to the rapid urbanisation in the tropics, governmental organisations should ensure that urban planning and design policies adequately address the socio-economic aspect and well-being of urban inhabitants and meet the sustainable development missions and visions.

Sustainable development is defined as 'development that meets the needs of the present without compromising the ability of future generations to meet their own needs' (Brandtland 1987). Sustainable development will only occur if the triple bottom line (environmental, social and economic developments) is consistently realised and no threat is imposed on the essential natural ecosystems.

Sustainable urban development also occurs when governments and urban dwellers attempt to maintain the sustainability of ecological systems that supports urban growth. Environmental sustainability focuses on the relationship of all living things, including people and their biological and physical environments. Environmental sustainability is a vital component for creating sustainable cities that are in balance with nature. One of the main components of environmental sustainability is climate change and increased urban air temperature. This section particularly focuses on one of the rapidly growing countries in the tropics, that is, Thailand.

As a developing country with rapid population growth, Thailand has encountered various challenges, such as high urban air temperatures and urban heat island (UHI), air pollution, flood, drought, poverty and overcrowding population. Overcoming these challenges and achieving sustainable development goals have become the main priority for the government, stakeholders and people in recent years. The population of Thailand is estimated at around 10 million people (Review 2020), and this number is expected to increase rapidly through the migration of people from the surrounding countryside.

Bangkok, which is the capital of Thailand, is one of the megacities in Asia. Bangkok has a monsoonal climate. The climate is hot and sunny from December till April. The city has also revealed a large value of the UHI effect caused by pavements, built-up surfaces and lack of vegetation (Thaiutsa et al. 2008). The monsoonal climate of Bangkok lasts for six months, demonstrating wet monsoon from May to October. The average daily temperature is high, ranging from 31 °C to 34 °C (Figure 4.1). The dry, sunny season starts in December and ends in April. Within these months, the solar intensity is high, and days become long. The evaporation rate ranges from 4 mm to 66 mm daily; this rate reaches its peak in April and its lowest in February. Figure 4.1 shows the monthly rainfall, evapotranspiration and daily temperatures.

Creating a sustainable society and a prosperous nation has been one of the main visions of the Thailand government. This vision emphasises the concept of 'sufficiency economy philosophy' after a long period of economic crises in Thailand.

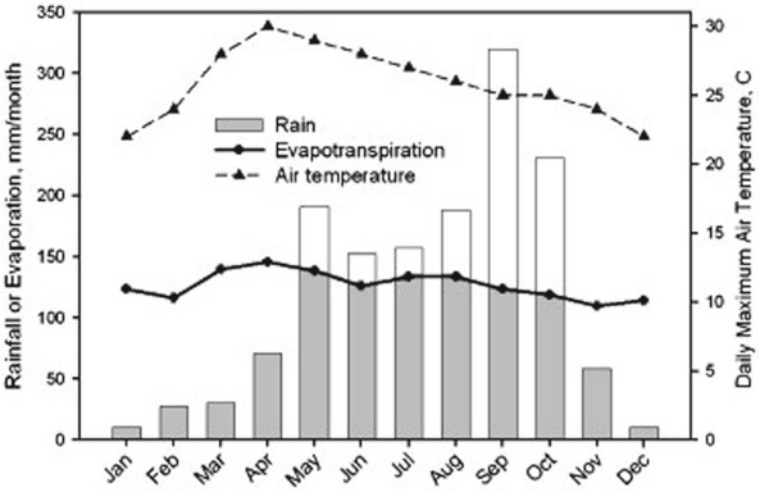

Fig. 4.1 Monthly rainfall, evapotranspiration (Hargreaves equation) and daily high temperature of Bangkok based on 30-year historical average data (Thaiutsa et al. 2008)

Today, the government's vision is to build a resilient society with a sustainable economic model based on Buddhism philosophy, which not only saves the citizens from poverty but also transforms the country into one of the exemplars of sustainable developments in Southeast Asia that can address the challenges of globalisation (Piboolsravut 2004).

Bangkok Metropolitan Administration (BMA) has encountered diverse environmental challenges and issues. Numerous planning and design strategies have been initiated by the government and city council to tackle these issues and mitigate the environment of the city. Green building and city policies, energy conservation, extensive use of renewable energies and increasing the green infrastructure in cities are some of the most promising strategies that have been identified in reducing the adverse impacts of urbanisation on humans, greenhouse gases and CO_2 emissions and public health safety. Since 2015, the BMA has initiated 31 m^2 of green space, which occupied around 2% of the overall area of Bangkok. The government has also initiated another mitigation strategy since 2009 called 'Bangkok - The Green City'. This strategy indicates the future development of the city and the plan for a continuous increase of green infrastructure. Furthermore, the process of reducing, reusing and recycling (3R) has been integrated to reduce waste, energy demand and greenhouse emissions in Bangkok metropolitan area, and the use of renewable energy has been encouraged amongst communities and stakeholders.

One of the major challenges for Thailand's inhabitants is climate change. According to the Intergovernmental Panel on Climate Change (IPCC) (2007), climate change is a result of greenhouse gas (GHG) emissions from the anthropogenic use of fossil fuels and/or fossil-derived materials (IPCC 2007). In 2012, 43 $MTCO_2$ were generated in the Bangkok metropolitan area [3]. Transportation and electricity

consumption account for over 40% of the overall GHG emissions. Additionally, the average temperature in the country has been increased from 38 °C to 40 °C from 2002 till 2013 (Statistical of Temperature at Meteorology Station 2013).

One of the pioneering tropical cities in tackling climate change and increased urban air temperature is Singapore, which launched a 'menu' of 86 heat mitigation measures that can be implemented in 7 key outdoor spaces in 2017. Some of these measures, such as the construction of the Marina Bay Financial Centre, have already been implemented. The unique design of this centre is intended to capture wind energy. The Urban Redevelopment Authority of Singapore demanded further research to examine whether some of these measures can be combined to magnify their cooling effects or whether their joint application would cancel out their intended effects. For instance, planting trees along a wind corridor can generate an evaporative cooling effect; however, this approach may also reduce wind speed and exacerbate thermal comfort. In another example, Putrajaya in Malaysia adopted the garden city concept and used its abundant green infrastructure and water bodies to provide shading and evaporative cooling for urban dwellers (Kuala Lumpur City Hall 2020).

Achieving environmental sustainability in the era of global climate change and urban warming is one of the four main objectives of the 4.0 economic model in Thailand (Jones and Pimdee 2017). This economic model aims to enable Thailand to tackle climate change-related issues and create a low carbon nation. Thus, Thailand has launched the Nationally Determined Contribution Roadmap on Mitigation (2021–2030) to achieve this goal and decrease greenhouse emissions by 20% till 2030. Some of these objectives have been addressed till today. For example, the greenhouse reduction was 45.72 million tons of carbon dioxide till 2020. Furthermore, 24 hectares of coral reefs and 880 hectares of mangrove forests have been rehabilitated, and the use of over 435 million plastic bags has been reduced since 2017. Increasing the percentage of green spaces in urban areas is one of the key strategies implemented in the action plan to reduce the greenhouse emissions, achieve environmentally sustainable Thailand and tackle climate change.

Green infrastructures are critical for public health, smart economy and well-protected environments. Increasing the green infrastructure is identified as one of the best strategies in mitigating environmental issues in tropical cities. The green infrastructures in tropical cities, such as parks, street trees, green walls, green roofs, sports fields, botanical gardens, green paths and urban rainforests and natural conserved areas, have diverse sizes and forms (James et al. 2009; Roy et al. 2012). Additionally, green spaces larger than 25 hectares, such as cemeteries and zoo gardens, can be used for recreational activities (Kabisch and Haase 2013). Green infrastructure is also known as a remarkable strategy to improve the mental, social and physical health of urban inhabitants (Wolch et al. 2014). The impacts of green infrastructure on mitigating the most important environment challenges (climate change), such as reducing the urban air temperature (Emmanuel and Loconsole 2015), energy consumption, air

pollution and rainwater fall off (Zhang et al. 2015) in tropical cities, have been well documented. According to the World Health Organisation, at least 9 m^2 of green space is recommended per capita to mitigate the adverse impacts of urbanisation on public health and the environment of the cities (Deloya 1993).

Green infrastructures are known for their diverse positive impacts, particularly in developing and rapidly growing countries with high urbanisation rates (United Nations Department for Economic and Social Affairs 2003). Successful urban greening, particularly in tropical cities, relies on the economy and ecological characteristics of the city (Randall et al. 2003). The financial and environmental aspects of greening the city are also strongly affected by the spatial distribution of green spaces; that is, the choice of the plants (between costly, typically less environmentally adapted, turf-flower ornamental landscapes against low-cost plants) that offer a large selection potential for environmental adaptation. A diverse range of selection is available for adapted plant species in tropical cities (Jim 2001).

Numerous sustainability initiatives considering greening the city have been conducted by city councils, communities and stakeholders. These initiatives are leading examples of encouraging the involvement of individuals in making Thailand resilient and environmentally sustainable. In this project, approximately 16,000 people, including students and professionals, put effort to prevent the trees in Thailand from being cleared by rapid urbanisation. As part of this project, a competition was run in 2014 amongst citizens to identify the 'heritage trees' that must be preserved and protected. In a recent action plan, awareness towards the role of trees in creating environmentally sustainable environments was raised through a collaboration with Fab farm and initiating a local market called '100 KM market'. This market aims to sell foods sourced from no more than 100 km away.

Bangkok green spaces are crucial in improving the liveability of the city, particularly during the dry season. Since 1990, the BMA has released a planting action plan, encouraging a street tree planting campaign. In the late 1990s, the planted trees and vegetation enabled the city council to improve the green unfractured and urban forest of Bangkok and introduced several environmental, economic and social benefits. Studies have shown that the diversity of trees can double these multi-aspect benefits (Thaiutsa et al. 2008).

Owing to the multi-aspect benefits of green infrastructure in bringing environmental sustainability in the tropics, this strategy has gained increased attention in Thailand, and no minimum is set for the scale of public green spaces. Scholars have found that increasing the green spaces in cities without over densifying the trees is the best strategy to mitigate climate change in the tropics [18]. However, research on the required quantity of urban green infrastructure in the context of tropical countries, such as Thailand, is currently limited. Furthermore, implementing the strategic plan of 'green city' within a limited space needs a high level of management.

4.2 Physical Sustainability (Focus: Transportation System, Street Life and Walkability)

Any city development involves a progressive transformation of the economy and society. However, physical sustainability cannot be secured unless development policies consider changes in access to resources and distribution of costs and benefits. The narrow notion of physical sustainability implies a concern for social equity between generations, which must be logically extended to equity within each generation (Brandtland 1987).

The Brandtland Report indicates that physical sustainability can only be achieved if development policies embrace the need for social equity by promoting equitable access to resources and the fair distribution of costs and benefits. Therefore, physical sustainability is predicated upon social and environmental sustainability as socio-economic factors that mitigate against social equity and ecological degradation, thus worsening climate change.

From this perspective, transportation is not merely related to engineering or technical solutions but is concerned with connecting people to opportunities in urban spaces and tackling social, economic and ecological aspects of multifaceted urban issues (Leuenberger et al. 2014).

Bangkok has been suffering from severe traffic congestion for decades. According to the Traffic Index Ranking 2019, Bangkok has the 11th worst traffic congestion in the world after other cities, such as Mumbai, Istanbul and Jakarta (TomTom 2019). A total of 9.7 million vehicles and motorbikes were reported in Bangkok in 2018; this total was eight times higher than the limited capacity of the roads (The Nation 2018). Such figures are increasing at the rate of 700 new cars and 400 motorbikes a day (Achakulwisut 2018).

The average car ownership in Bangkok is 100 people for 77.46, which is four times higher than the Tokyo metropolitan area (Pongprasert 2017). The existing road system cannot cope with the intensifying traffic demand. The increasing private car ownership and heavy congestion have worsened the already serious air pollution and greenhouse gas emissions.

The streets in Bangkok are in a labyrinth arrangement, demonstrating narrow lanes and alleys without proper transport planning due to the organic development of the city. The coordination between land use patterns and transport networks in Central Bangkok is also poor, resulting in the existence of superblocks, which are enclosed mixed-use areas with limited connections to the main streets. The road network inside superblocks is often narrow, discontinuous and dead-end. Over 37% of the roads in Bangkok are dead-end, which is a far higher percentage than that of the other major global cities (Marks 2019). Consequently, many roads become traffic bottlenecks, affecting the connectivity of the city.

Instead of relying on road-based transport, mass transit systems were developed (Figure 4.2). The idea of mass transit system development in Bangkok was firstly proposed in 1975. However, the BTS Sky Train only began its operation in 2000, followed by the Metropolitan Rapid Transit in 2004 and the Airport Rail Link in

Fig. 4.2 Sky Train above the road system in Bangkok (Commons 2004)

2010 (Rujopakarn 2003). The original idea of a mass transit system is to provide a 'safe, comfortable, fast, convenient, reliable and affordable' mode of transport (Hoskin and Dunlop 2000). However, the service area covered by the mass transit system is still relatively small and mainly limited to the inner city. Additionally, ticket fares are expensive for many Thais, especially for low-income migrant workers. The affordability of the mass transit system becomes a concern under physical sustainability because it excludes access to the public transport infrastructure by low-income groups.

In addition to mass transit systems, other modes of transport in Bangkok include canal boats, buses, taxis and motorised three-wheelers (*tuk-tuk*s). Canal boats were once a dominating mode of city transport, and Bangkok was known as the 'Venice of the East' (Hossain and Iamtrakul 2007). Since the twentieth century, water-based transport, particularly along inland waterways, has been replaced by road-based transport, and many waterway networks have been paved with roads (Iamtrakul and Wongbumru 2019). Canal boats have limited service areas along both sides of waterways and are poorly connected to the land transport networks, whereas buses have wide coverage, connecting the suburbanites of Bangkok to the inner city.

Although bus services are affordable, many buses are old and outdated. Few areas in Bangkok also have dedicated bus lanes but are scattered and disconnected, affecting their effectiveness (Marks 2019). As paratransit, car taxis, motorcycle taxis and *tuk-tuk*s are indispensable in Bangkok, offering flexible, affordable and personalised transport services to the general public (Phun et al. 2019). Some of the roads and lanes are quite narrow and long, especially those in superblocks, which are insufficiently

wide for cars to pass through, creating the need for motorcycle taxis and *tuk-tuks*. The paratransit services provide job opportunities for low-income people and boost socio-economic activities in the community.

Controlling the number of vehicles on streets through well-thought-out traffic management systems is crucial to alleviate traffic congestion in Bangkok. An interactive traffic management system can be implemented to monitor traffic volume and optimise vehicle movement. Financial deterrents can be imposed on the use of private vehicles in certain routes or areas to reduce the traffic flow, and tax-based measures can be levied for owners of personal cars to regulate vehicle ownership.

4.2.1 Homogeneity, Segregation and Street Life

Under the influence of globalisation, the skyline of Bangkok has become homogenised within recent years. Similar to the other modernised metropolises worldwide, glistening skyscrapers and stereotypical shopping malls are ubiquitous. In Bangkok, high-class office towers, top-end shopping malls and luxurious hotels along the skytrain stations are connected by systems of skybridges. These skybridges direct middle-class, global consumers and urban elites from one privatised air-conditioned space to another for consumption, recreation and work. Such an elevated urban realm provides a seamless mobility corridor for a new urban life and surpasses the notorious traffic congestions of the city, contributing to a segregating effect that separates social groups and classes (Richardson and Jensen 2008).

Busy and noisy streetscapes are found below the skytrain elevated platforms and skybridges. Enthusiastic vendors selling all sorts of souvenirs, clothes and food have been a distinctive street culture in Bangkok. Under the notion of civic beautification, the existence of street vendors and hawkers are often regarded as a problematic issue by the government due to their encroachment of public spaces and obstruction to pedestrian flow (Jacoby 2016).

In 2014, the BMA launched a campaign to reduce the number of licensed street vendors. This campaign led to a drop of more than 17,000, with only a few thousand licensed vendors remaining. However, the presence of vendors and hawkers enhances street vitality and represents the traditional characteristics of Bangkok as a salient tourist attraction. Street vending, which is one of the significant informal economy activities, provide affordable goods and services to serve the general public and contribute to the daily social life in Bangkok (Roeksiripat 2016). The small trading of vendors is often initiated by urban grassroots with low-income and education levels. Therefore, any large-scale eviction of street vendors will disrupt the livelihoods of the vulnerable groups and worsen the socio-economic disparities in the city. If street vending can be properly managed and regulated, then striking a balance between civic beautification and informal economy, as well as maintaining the unique street culture of Bangkok for tourism and job opportunities for the unskilled workforce and low-income groups, would be possible.

Streets play a significant role in providing valuable public spaces for urban life (Gehl 2011). Instead of being used predominately or even exclusively by cars and motorbikes, street life can be activated to transform the city to be walkable. The traditional roles of streets, such as meeting places for social interactions and marketplaces for business activities, should aim to address the socio-economic demands of urban dwellers (Figure 4.3) (Efroymson et al. 2009). However, the total length of footpaths in Bangkok is only 175 km^2 or around 10% of the total city area (Kongrut 2015). In a research on walking modal share in nine Asian cities, Bangkok had slightly over 10% of trips made on foot, which was the least percentage compared with nearly 50% in Mumbai or over 40% in Jakarta and Ho Chi Minh City (Montgomery 2008). Bangkok was considered to be a car-dependent city in the Walkability Surveys in Asian Cities supported by the Asian Development Bank; in these surveys, the walkability ratings of 15 Asian cities, excluding Bangkok, were compared (Gota 2010). Although Bangkok was not included in the Walkability Surveys in Asia, some studies were conducted to evaluate the walkability and pedestrian satisfaction around transit stations in Bangkok (Ozawa et al. 2017).

A car-free policy has been actively promoted worldwide to pedestrianise selected streets to minimise the disturbance of vehicular use and associated fumes and noise, which, in turn, lead to pedestrian-friendly public spaces (Gehl 1989; Nieuwenhuijsen and Khreis 2016; Vernez-Moudon 1987). Silom Road in the central business district of Bangkok, which was introduced in 2002, is the first pedestrian street in Thailand (Oranratmanee and Sachakul 2014). Walking streets discourage car dependence and encourage social and cultural activities for the public, making the city liveable. Silom

Fig. 4.3 Street life in Bangkok (*Source* [Commons 2013])

Road is one of the most congested streets in Thailand. Thus, converting this road into a pedestrian street at a certain period of a month can serve as a convincing example for further implementation of car-free days to other areas in Bangkok and beyond. Pedestrianisation excludes motor vehicles and encourages walking and cycling as non-motorised modes of mobility.

An intrinsic link is found between walkability and physical sustainability. Walking is the first mode of sustainable transport with the following multiple benefits: providing opportunities for exercise, facilitating social interaction and supporting the local economy by encouraging shopping in the community. Similar to walking, cycling is also affordable with substantial health benefits and sustainable with zero carbon emission.

Bangkok is suitable for cycling due to its relatively flat terrain. However, the existing bicycle lanes are primarily for sports and recreational purposes and are often disconnected from the main transport network. Bangkok also has many crossings and mixing with motorised traffic, which poses safety risks to cyclists (Bakker et al. 2018). Providing well-connected exclusive bicycle lane networks, tackling the potential conflicts between cyclists and pedestrians and giving adequate parking provisions for bicycles are important for the development of cycling-inclusive infrastructure.

4.3 Social Sustainability (Focus: Housing)

Informal settlements have existed in Bangkok even before the First World War.[1] However, before the 1940s, Thai housing policies did not consider slum households, which were excluded from public and government concern (Giles 2003; S. Porn-chokchai 1992). Slum-dwellers were formerly perceived as seasonal migrants who came into cities when the agricultural period ended and returned home once the cultivation season started. The population size of rural migrants significantly varied throughout the year, and most members of migrant households maintained their registration in their home village. Therefore, the Thai administration did not count slum inhabitants as legitimate city residents (Yap and De Wandeler 2010).

By 1957, the First National Social and Economic Development Plan (1st NSEDP) was established as a countrywide road map towards urbanisation. The implementation of the first–fourth NSEDP has transformed almost every aspect of national infrastructure from a socio-economic foundation based on agriculture to industry. A sharp increase in government infrastructure investment and import–export-oriented industrialisation had concentrated development in Bangkok and major regional cities. Labour for industrial production was on high demand and resulted in the migration of a rural labour force searching for employment and income. Consequently, the shift of

[1]The first informal settlement in Thailand is factory slum, located nearby Prem Pra Cha Canal, Bangkok (Na Thalang, 1978).

the national development pattern led to an accelerated massive internal labour migration from the peripheries to Bangkok and prime regional cities across the country (S. Pornchokchai 2005).

Once the main avenue of national development transferred to the industrial sector, many rural households entered cities to search for work and life opportunities. Numerous migrant households ended up working in urban production in the formal and informal sectors, such as factories, transportation and building construction. Slum settlements are attractive to low-income households because they supply inexpensive housing in a good location close to the source of employment and public facilities. Informal settlements provide flexible housing arrangements and allocate lands available for self-help construction. Slums also have a variety of temporary houses and rooms for rent at affordable prices. These options are suited to the condition of considerably poor people and recent arrivals who cannot lease or own houses. Therefore, the Bangkok slum settlement has become a permanent shelter, and the number of migrants constantly increased yearly (between the 1950s and the 1980s). An example is the Klong Toey slum with 20,000 inhabitants (Figure 4.4).

Fig. 4.4 Klong Toey Slum (meaning; the canal of pandan leaves, as the plant grew along the southern bank of the canal). They rent on the land of Port Authority of Thailand (*Source* [Hongtong 2019])

4.3.1 Housing Provisions to Address Slum Housing Challenges

4.3.1.1 Formal Housing Provision

Formal housing provision is the conventional mode of slum upgrading programmes in Thailand provided through official channels. The Thai government made its first attempt in the housing field in late World War II, during which housing was critically in short supply throughout Thailand (Giles 2003). By the 1940s, 'The Town and Country Planning Act' and 'The Welfare Building Act' were launched (Karnjanaprakorn and Bunnag 1978), followed by the establishment of many government agencies, such as the Public Housing Division (1940), the Housing Bureau Act (1942), the Public Housing Bureau (1951) and the Government Housing Bank (1953).

The effort of promoting public housing policy did not produce sufficient new housing units in the formal market. Around 17,000 new public housing units were constructed by the four separate housing agencies between 1949 and 1973 (Na Thalang 1978). Consequently, three of the four housing bodies, except for the Government Housing Bank, merged into a national autonomous organisation, that is, the National Housing Authority of Thailand (NHA) in 1973.

The slum upgrading programme, which was first implemented in Thailand under the NHA Priority Plan (1979–1982), was endorsed by the World Bank and the UN-Habitat to upgrade 26,800 units. The following five development alternatives were adopted for customisation with individual community context: slum upgrading in existing locations, slum re-blocking, re-construction, slum relocation and land-sharing (Buranasiri 1983).

These programmes were expensive and created a high debt burden; financing the provision of access to land was the limitation of this policy (Sopon Pornchokchai 2003). Yap and Wandeler highlighted that the majority of landlords did not consider land tenure formalisation to be an acceptable option because the land became a valuable asset during the period of economic growth (Yap and De Wandeler 2010). Consequently, few public landlords participated in the slum upgrading projects. However, the number of slum evictions remained high, particularly on private land.

The years between 1980 and the 2000s were a relatively long period of economic growth in Thailand. The market deregulation enabling policy resulted in a high number of new affordable apartment units, particularly in Bangkok (Dowall 1992). Therefore, a relatively large proportion of these affordable units had been taken up by high-income groups as investments (S. Pornchokchai 2005). The Agency for Real Estate Affairs of Thailand survey revealed that 35% of approximately 300,000 units in 1995 remained vacant despite having been sold (AREA 1996). In 1992, the Thai government subsidised the initial capital of 1.25 billion baht for urban community organisation development. The funding administrator was a new agency, namely, the Urban Community Development Organisation (UCDO later transforming to 'Community Development Organisation Institute' or CODI). The funding aimed

Fig. 4.5 Informal Housing Provision, political activity of Four Region Slum Network for housing security in Bangkok (*Source* [TransborderNEWS 2016])

to increase the slum inhabitant financial assets and capacity through micro-credit, saving group and broad collaborative networks amongst low-income community organisations (S. Boonyabancha 2003).

4.3.1.2 Informal Housing Provision

Although the Thai government has put significant effort to address the slum housing challenges through a variety of formal policies and agencies, practices on the ground substantiate the failure of these attempts to accommodate key aspects of slum housing needs. Before the arrival of the slum upgrading programme, government agencies adopted legal measures to handle the growth of slum settlements in Bangkok. Moreover, inhabitants often ended up being forcibly evicted. Before the 1980s, slum eviction only occurred on public land rather than private land due to urban infrastructure development on governmental land that occurred between the first and the fourth NESDP. Boonyabancha revealed that the distribution of slum areas already evicted and under eviction on public land was 66.2% and 21.7%, respectively, on private land (S. Boonyabancha 1982). The evictions were widely reported in the press; for example, a climate resulted in the entry of NGOs in Bangkok slum housing who became active in resisting eviction in the 1980s (Giles 2003) (Figure 4.5).

The first NGO associated with slum development issues was founded in 1973 (Chantarapa, 2009). This NGO comprised a group of civil servants who formed the 'Slum Problem Study Group' to collect information and partially assisted a slum community at Klong Toey[2] in Bangkok. These civil servants provided community services that local authorities usually refuse to provide due to the contravention of by-laws.

[2]Currently Klong Toey is the biggest slum settlement in Bangkok and in Thailand locating on the 78 Acres of land of the Port Authority of Thailand. Klong Toey slum consists of 31 sub-communities include population around 20,000 households (https://www.ddproperty.com/, accessed 22nd February 2020).

The shift in national structure, particularly since the 1980s to 2000, was closely tied to economic growth. This shift supported the massive expansion in the size and importance of the role of NGOs, the media and middle-class institutions. Therefore, the number of NGOs addressing slum problems increased during the 1990s; by 1992, at least 32 registered and 19 unregistered NGOs were established in Thailand (Ockey 1996).

The real estate housing market failed to reach the poorest 30% of the population due to the private housing market expansion between the late 1980s and 2000s (S. Boonyabancha 2005). Affordable housing became associated with the speculation of upper socio-economic classes, whilst the genuine target was disregarded. Additionally, overall UCDO funding and practices have been ineffective in introducing any visible changes in land tenure security and slum evictions. Several slum communities became frustrated with the limitations of the UCDO process (Visetpreecha 2008). From the perspective of NGOs, the saving process was an ineffective solution to secure land tenure for slum households because it was time consuming, especially in the context of inflation and rapid land price appreciation. NGOs and slum communities began to perceive that the root of the slum housing problem was associated with political struggles over land. Instead of establishing a savings group, the priority of achieving land security tenure is the provision of access to land (FRSN 2010; Hall 1987). Hence, a group of slum communities gathered and established the national slum organisation, namely, 'The Four Region Slum Network', in 1998.

In practice, the FRSN has been politically active, and some of its prominent cases include negotiations for long-term land leases and stopping eviction by the BMA of over 100 slum squatter households along Bangkok canals (FRSN 2010). By 1998, the FRSN collaborated in demonstrations and lobbied with other organisations for policy changes, such as building regulations and additional Baan Mankong funding. The role of FRSN even went beyond the national terrain upon joining in international cooperation with slum organisations and NGOs across Asia.

Ideas on land accessibility as a crucial element in urban housing challenges between formal and informal agencies are extensive. Slum housing in Bangkok has been significantly formulated in the context of contradiction rather than the coherence of visions, agencies and practices. Bangkok slum housing highlights the paradox between formal and informal provisions for low-income households. Whilst formal housing provision applies social and economic approaches, the community and NGOs alternatively promote the political approach. They perceive that slum housing problems are associated with the inequity of national policies, particularly land use and distribution, rather than the financial difficulty view of the government. This difference also reflects the fundamental narrative of Bangkok slum housing with two distinct structures: government-driven 'top-down' and NGOs plus community-based 'bottom-up'.

Although Thai housing development has a contradiction of practices amongst relevant agencies, formal and informal housing provisions have similar goals, promoting well-being and providing a good life quality of slum inhabitants. Similarly, slum housing in Thailand is a process of creating social sustainability for low-income people and communities because it establishes the following: a social platform for

local people to develop capacities, skills and knowledge; citywide networks to meet the needs of its current members and future generations to maintain land tenure security. The role of slum inhabitants in politically active and saving schemes for housing attains one of the performance issues of social sustainability, empowering the capacity of slum inhabitants.

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Chapter 5
Sustainable Reuse of Heritage in the Middle East Constrained Environments

Silvia Mazzetto

Abstract This chapter presents some interesting examples of restoration projects, recently completed in Middle East regions, by comparing the sustainable principles and highlighting how traditional construction techniques are also sustainable because they are perfectly integrated into the constrained environments. The chapter explains that there is currently a growing need to enhance local traditions and architecture in the Middle East for searching and defining the local identity of places. The adopted research approach has integrated the use of analysis and comparisons based on the literature review and site visits, for some particularly significant examples of heritage adaptive reuse. The projects were analyzed and compared, considering the aspects related to the sustainable approach of the interventions concerning the constrained environments, and to the cultural, social, and economic, criteria of analysis. The results show many compatible elements between the reuse of a nation's heritage, the restoration of traditional materials, the advocacy for local cultural values, synergy with the landscape, and climate adaptation that must be compatible with the buildings reuse and with the constrained environmental conditions. Therefore, the sustainability concept is addressed through its meaning of harmony and unity and harmony in a comprehensive meaning, considering the materials used, respect for the ecosystem, cultural aspects, investments, costs, and the enhancement of the sense of community belonging. The aim is to define a persistent approach in the heritage restoration and reuse, capable of enhancing the Middle East culture, by respecting sustainability and constrained environmental conditions.

Keywords Sustainability · Socio-cultural values · Economic growth · Environmental context · National identity · Tradition

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5.1 Introduction

The historical development of many Middle Eastern countries has always been severely affected by the constrained environmental conditions, which have caused fragility and slowness in the development of local economies. The heat and drought of many subtropical territories of the Middle Eastern countries have led to stressful life conditions due to the inhospitable environment. However, in recent decades, the oil discovery and exportation have produced radical transformations both in the economy and in local societies, generating unprecedented construction booming and accelerating construction processes, infrastructures, and transportation. Unfortunately, the rapid growth has also led to a dangerous detachment from the traditions and natural characteristics of the places, seriously affecting the safeguard of culture and national heritage, which has, in many cases, been neglected, destroyed, or abandoned in adverse conditions. Only recently, the growing interest in history and the protection of traditions has led many Middle Eastern countries to finance and complete many restorations and reuse interventions of heritage for enhancing the values of culture and traditions affected by constrained environmental conditions.

The Middle East Area and particularly the Arabian Peninsula has always been characterized by tropical and subtropical environmental conditions, particularly inhospitable for the survival of communities, business development, and economic growth. However, in the last decades, the discovery and exportation of oil have radically transformed, which has rapidly become a new regional and international economic hub. The local villages have quickly turned from small tribal settlements into new globalized economic centers.

The first discovery of some oil fields started in 1938 in the Saudi Arabia and Bahrain countries (Salama 2012), and immediately the traditional economy link to the survival of the local population in such constrained environments, changed into a fast construction booming which completely changed the economy of the Middle East regions. The traditional communities' adaptation to survive in such a constrained environment, wholly changed into Gulf countries' and Emirates' cooperation, the Gulf Cooperation Council (GCC), founded in 1981 to support the common business interest of the affected countries.

The limited natural resources of the Middle East regions, in the 1970s, were completely transformed into new businesses and the industrialization process generated by the oil exportation, which generated an industrial revolution and an extensive fast, economic growth, by completely changing the traditional urban fabric, the local social organization, and the life of the place. The old monuments and buildings are currently the last testimonies of the ancient culture (Carbonara 2012) for the adaptation and resilience of people and activities to the limited natural resources of the place. Understanding the heritage testimonies of past centuries is vital for transmitting the local culture and traditions to future generations of Arab cities, which show the artistic creativity and identity of the places (Feilden 2015). Any element of heritage is a complex product of the society (ICOMOS 2008), having unique "values"

and meanings and is indispensable for the understanding of the local transformation and the popular adaptations to the sites.

5.2 The Safeguarding and Reuse of Heritage in the Middle East Regions

The definition of a sustainable approach for safeguarding the heritage for the United Nations Educational, Scientific, and Cultural Organization (UNESCO-ICOMOS 2010), and the World Heritage (UNESCO 2002) is linked with the values of improving the life cycle of any historic structure to reach some significant cultural, social, economic, and environmental results that should respect the diversity of cultures and places (Landorf 2009). The sustainable intervention on heritage has to adapt to the constrained environment and involves the use of available resources and materials to permit adaptation to specific environmental circumstances and meet local requirements and community needs.

In the past years, many cases of conflicts related to the protection and safeguard of heritage buildings raised for the different methodologies adopted in the sustainable direction of countries' growth. Many buildings' protection laws are often in contrast with the historic buildings' reuse or specific sustainable elements of protection.

The chapter aims to analyze some restoration projects recently completed in the Middle East area, by comparing the past functions with the current reuse and how interventions have promoted the sustainable approach and the appreciation for ancient social values and cultural traditions in the diverse countries and a various constrained environment.

The research presented some considerable examples of recently completed heritage restoration projects (case studies), chosen from the literature and from site visits among diverse scales of interventions (urban, architectural, landscape), to demonstrate how the reuses and the sustainable awareness can enhance the promotion of the local identity. The selected projects Al Jahili Fort and mosque, Al Bastakiya Quarter in the United Arab Emirates; Barzan Towers, Al Zubarak Fort, Al Taghab Fort, Old Amiri Palace, Heritage Houses complex, Al Dakkira Mosque, Al Ruwais Mosque, Al Wakrah Souq, Souq Waqif, and Al Zubarak archeological site in Qatar, Old Sana'a Settlement in Yemen, Saifi Village, and Horsh Beirut in Lebanon after completion, have produced many environmental, economic, and social benefits, and have promoted the values of their country's identity too.

The sustainable approach of reusing old historical buildings and urban areas has adopted local natural materials that are compatible with the conservative/restorative interventions, has promoted reuses compatible with the constrained environment, and has reduced the emission of pollutants. Economically, by adopting local materials, the construction costs have been reduced, as well as the quantities of energy consumed. From a social point of view, throughout the compatible and sustainable reuses, the

local economic growth has been promoted, enhancing the culture, perceiving and appreciating the heritage, synergy with the environment, and the country's climate.

Field observations, site visits in the Arab Countries, sets of photographs taken onsite, hand sketches, and drawings, served as a comparative tool and helped contextualize the analyses and confirm the findings.

The comparisons of the case studies in the constrained environment of the Middle East regions have focused mainly on three sustainable criteria: socio-cultural, socio-economic, and socio-environmental, derived from the adaptive reuse proposals, over a range of dedicated principles on the various scales of interventions (urban, architectural, landscape), as for the following list:

A. Socio-cultural criterion;

1. To enhance the social inclusion
2. To promote cultural diversity
3. To discover personal and community belonging
4. To enhance social attachment
5. To improve appreciation of cultural values
6. To improve the quality of labors' working conditions

B. Economic criterion;

7. To improve the highest social values
8. To enhance economic growth
9. To support the local economy

C. Environmental criterion:

1. To respect the environmental context
2. For the benefit of natural and climatic resources
3. To reduce pollution and materials' waste
4. To minimize the climatic changes
5. To reduce the natural hazard effects

The research compared five main typologies of adaptive reuse interventions, which have promoted different principles over the sustainable criteria:

i. Restoration and reuse of historic defensive buildings to enhance the value of local building traditions;
ii. Restoration and reuse of historic residential buildings, settlements and quarters of old and contemporary city centers to strengthen the sense of community belonging;
iii. Restoration and reuse of religious buildings such as mosque to improve appreciation of cultural traditions and enhance the highest social values
iv. Restoration and reuse of commercial areas such as ancient souqs (market) to support the local economic growth and attract tourists.
v. Conservation, restoration, and reuse of natural and archeological parks, to respect the environmental context, and climatic resources.

5.3 Adaptive Reuse of Defensive Structure: Rediscovery the Building Traditions

The tropical and subtropical territories of the Middle East present numerous and varied defensive structures with different shapes and characteristics: forts, watch-towers, and fortified residential buildings. The defensive constructions protected the inhabitants and villages from attacks by nomadic invaders, which occurred frequently in the past. In such constrained territories, the local inhabitants used to protect the few wells of drinking water and the groves palms, fundamental and indispensable sources for the survival of the local peoples. After the oil discovery such structures were abandoned and neglected for many years and consequently subjected to acute deteriorations, however recently, many governmental institutions, in charge for heritage safeguarding in the Middle East regions, have financed and completed many restoration works and adaptive reuse interventions to provide new life to defensive structures.

Al Jahili Fort, located in the Emirate of Al-Ain in the United Arab Emirates, was probably constructed in 1891 for defensive reasons, lately used as a residence, and recently in 2007 restored by Abu Dhabi Tourism and Culture Authority (Abu Dhabi Department of Culture and Tourism 2017). The fort is constructed by local materials such as coral and limestone blocks and mud mortar and masonry. The restoration project has adopted natural materials and traditional construction techniques, together with reinforced concrete and cement mortar to consolidate structurally the massive defensive walls and the round towers located on the corners. The fort is currently reused as a permanent exhibition of Sir Wilfred Thesiger's explorative discoveries in the area. The state of conservation after the intervention is excellent, and the structural stability is wholly guaranteed. The fort used as a museum permits the discovery of ancient traditional construction techniques and the historical traditions of the community life and the shared support of the inhabitants to defend their lives and survival, the fort attracts many local and foreign visitors every year. It is today one of the best-preserved examples of a defensive fort in the Emirates.

In Qatar, the two Barzan Towers were restored in 2015 by the Qatar Museum Authority. The towers constructed as part of Doha's defense system against the Ottomans attacks were also used to protect the natural valley where the rainwater was stored. In 2015 the consolidation works were extended to the foundations and buttresses, severely damaged by structural cracks due to the structure weight.

The plan of the two towers is rectangular, and the defensive walls were constructed with local materials, such as limestone and coral blocks, mud mortar, mud, and gypsum plaster, wooden lintels ("danchal") and rainwater gargoyles ("marazim" usually protected by a layer of bitumen ("basgijl"). The structural consolidation works have increased the structural stability by reinstating the corners buttresses, and most of the original materials were consolidated such as plaster, lintels, doors, and windows, joisted floors so that the towers today are reused as a museum of the defensive structures, where to explore the traditional construction techniques and

Fig. 5.1 Al Zubarah fort reused as a museum of the fort, after the completion of the restoration works (Credits: author)

materials. The towers attract many visitors every year, although the museum is not yet served with any thematic visit tour.

In Qatar, many forts have been recently restored and reused by the governmental authorities, such as the Al Zubarah and Al Taghab Forts, which are located on the northern side of the country. Al Zubarah fort (Fig. 5.1) was constructed to protect the area from foreign attacks (Walmsley et al. 2010) nearby the archeological remain of the ancient Al Zubarah settlement.

The fort has four defensive towers and massive defensive walls built with local materials, such as coral and limestone blocks, mud mortar and plasters, wooden lintel, and joisted floors. The historical materials, during the restoration, works in 2015 carried out by the Qatar Museums were preserved and protected to guarantee a sustainable intervention by planning the maintenance to preserve the structure from any damage. The fort is currently used as a museum and a cultural center for the archeological findings of the nearby Al Zubarak and is part of a touristic circuit for visiting the country. In the museum, the drinking water well has been restored, and the thematic visit tour permits to discover the local residential and life culture of ancient inhabitants. It is the best-preserved and restored example of a fort in Qatar. The reuse intervention has strengthened the socio-cultural values of the site by the rediscovery of Qatari defensive traditions, the values of community belongings while enhancing the socio-economic attributes of the site, able to adapt and integrate over the centuries, with the environmental characteristics of the constrained climatic conditions (Mazzetto 2018a, b).

Fig. 5.2 Al Taghab fort in Qatar. Completed restoration works (Credits: author)

In Qatar, Al Taghab fort (Fig. 5.2) is another traditional fort in the desert built in the nineteenth century to protect the drinkable water wells, in use from 1911 onwards.

The fort is rectangular in plan with three circular towers and a fourth rectangular tower on the corners and a central courtyard used to store goods and for the social activities of the inhabitants' community lives.

The defensive structure was mainly reconstructed by local authorities' end of the 1990s using layers of coral stones and limestone blocks bonded with mud mortar and gypsum plaster to increase the wall thickness for structural reasons of foundations and wall consolidation and to protect the inhabitants from thermal insulation. Today, the recently reconstructed layers of blocks are still readable, and the fort is in a good state of conservation having stable wooden structures for the roofs and stairs. The fort is currently used as a museum of the fort, being open and accessible for visits, although it is still not in place any specific thematic tour. Here the restoration works, and the reuse has strengthened the socio-cultural values of the place by discovering the traditional construction materials and techniques mixed with the adopted approach to reconstruct the collapsed portion of structures to give back the idea of the original shape and function of the fort.

5.4 Residential Buildings: The Rediscovery of Community Life Traditions

The attention for heritage restoration and reuse has also interested in many examples of residential buildings. In Qatar, the Old Amiri Palace was built by Sheikh Abdullah bin Jassim Al Thani under Ottoman authority. The structure includes three courtyard houses and an extended majlis (living room) (Bulosan 2016). Recently (2013–2015), the palace complex has also been subjected to a detailed restoration project and maintenance program by involving mainly the structural consolidation of foundations, walls, slabs, and floors under the supervision of Qatar Museum Authority Conservation Team. The walls structures are made of limestone and coralline rubble covered with mud plaster layers to protect the buildings from the aggressive sea environment, that have severely damaged the structures over the last decades. Other natural materials such as wooden lintels, bamboo strips, and woven matting, lime and mud mortar have been restored and replaced with other natural products and materials. Basic structures for the new additions were built with concrete slabs and beams during the last restoration projects to reinforce the structures. The Palace is part of the Qatar National Museum complex. The restored buildings provide an authentic image of the traditional residential structural system and construction techniques and have improved the appreciation of suburban life's cultural values in a constrained climate environment, showing the people adaptation to survive and desert environment before the oil discovery.

The restoration project (2015) of the Heritage House Quarter in Msheireb Downtown Doha, was recently completed in 2015, by the Private Engineering Office. It consists of four traditional Qatari houses: Bin, Mohammed and Bin Jassim House, Company House, Radwani House, and Jelmood House constructed in the early twentieth century. The residential buildings are built with local materials, such as limestone blocks, mud, and clay mortar, mud plasters, and currently represent an example of the local building traditions, that were mainly preserved during the restoration works. The intervention approach was guided by principles of preservation and recovery of all the original construction materials to replace only a few missing parts. Such an approach has permitted the preservation of essential testimonies of traditional residential life inside the houses by discovering the sense of personal and community belonging and enhancing the social attachment to the traditional values of life in Qatar's constrained environment. The cultural values have been promoted by reusing the houses as the new Msheireb Museums where to discover the local tradition, memories of the site history, and the past social conditions of life.

In the historic center of Dubai in the United Arab Emirates (UAE), the Al Bastakiya Quarter (Salama and Wiedman 2013) was restored in 2003 by the Dubai Municipality. The residential district built in the nineteenth century has important testimonies of heritage values, after being abandoned for many. Before the restoration, the houses' structures were severely damaged by structural collapses and have been reconstructed and consolidated to provide new stability. The rooms are currently

used as cultural museums for local and touristic visits to rediscover the country's ancient traditions.

In Lebanon, another example of interest in safeguarding the heritage has been realized during the reconstruction of the country after the civil war to safeguard the local culture, throughout the supervision of the company Solidere (Société Libanaise pour le Développement et la Reconstruction de Beyrouth).

The Beirut Central District (BCD) area was almost totally reconstructed by preserving only the old alignments of traditional buildings dating back to the nineteenth century and restoring few remaining ancient structures. The intent was to reduce the memories of the pre-war to a minimum and avoid any link with the old architectural structures. However, the neighborhood of Saifi Village (Fig. 5.3) located on the south side of Beirut Central District, was an experimental reconstruction that adopted the reference to French colonial buildings, recalling the traditional past style of the place, existing before the war. Since the area was completely bombed and destroyed during the war, the intervention was entirely a reconstruction that anyhow adopted a recall of the vernacular style to link the future with the past of the country with the aim of requalifying and reconnecting its traditional reconstruction to the new globalized city of the future.

Unfortunately, the project's intention did not reach the expected results, and the reconstruction was not able to bring back the residential vitality to the capital Beirut synonymous with the past, because the Al Saifi Village area is mainly empty with not much residents. The reconstruction project, based on high standards quality of interventions, have produced a costly business center. Although the vernacular style architecture calls back the traditional residential characteristics and the sense of past community around the new urban piazzas, the public spaces do not generate a sense of social connection and interaction, and the places are not populated enough yet.

Another complex restoration project was completed at the end of the 1980s in Yemen (Fig. 5.4). The Old Sana'a, the residential settlement, was completed by adopting the vernacular typology to reconstruct a part of the old city, under the supervision of the General Organization for the Preservation of Historic Cities of Yemen.

The old residential structures of the city, built with local materials by combining layers of mud, bricks, and stone blocks, were reconstructed using the same old materials and construction techniques, by respecting the place history, integrating the old structures with the new needs, recognizing the feeling of community belongings and enhancing the sense of mutual support typical of traditional Islamic settlement during early years of Islam. The house's architecture reflects the Ottoman style that dates back to the beginning of the sixteenth century, and the adopted local materials have improved the respect to the environmental context by demonstrating the adaptation of the traditional residential buildings to the constrained environmental conditions, to protect the inhabitants from heat and the constrained local weather conditions. The residential palaces and historical buildings today are reused as museums and exhibition places (Lewcock 1986) to improve the appreciation of local cultural values still existing in this heritage site.

Fig. 5.3 Saifi Village after the reconstruction works (Credits: author)

The analyzed interventions, although located in diverse countries, have reused most of the heritage residential areas in the cities' centers. The reuses have permitted to appreciate the local residential uses' values by enhancing the transmission of cultural tradition linked to old spaces and functions. Most of the socio-cultural principles have shown the capability of the old buildings to adapt to the population's needs, after the restoration works and the new functional uses. They have become allowed to strengthen social values, thanks to the recognition of old social cohesion in the territory.

Fig. 5.4 Al Ruwais Mosque during the restoration works (Credits: author)

5.5 Religious Buildings to Improve the Highest Social Values

In the Middle East in past times, religious buildings (mosques, minarets, etc.) were important public places able to host a congregation of people to pray and perform their devotion, because, although nowadays the functions of mosques are various in the past they were mainly used for praying and for primary religious children education. During the spread of Islam across the Islamic world, in the Middle Eastern area constrained by the critical environmental conditions, many ancient buildings were transformed and adapted to the religious function. In the past, the presence of a mosque was always linked with the human spirit of mutual support and the attachment to the community.

The neglected old Al Dakhira Mosque (Fig. 5.5), located on the north side of Qatar, after the oil discovery in the country, has been abandoned for many years, in a bad state of conservation till when was restored in 2015 through the supervision of Qatari Private Engineering Office.

The mosque structures were severely damaged, the foundations presented various cracks and were restored during the works throughout a massive reconstruction done with reinforced concrete. Although the intervention tried to privilege the use of traditional local material such as limestone and coralline blocks, wooden poles, mud mortars, and plasters, the structural consolidation has done with cementitious

Fig. 5.5 Al Dakhira Mosque, reused as a religious center (Credits: author)

materials necessary to guarantee the building stability. Today, the mosque is reused as a new cultural and religious center calling back inhabitants and local people to the religious function after many years of abandonment.

Similarly, the old Al Ruwais Mosque (Fig. 5.4), located on the northern side of Qatar, was abandoned for many years and restored in 2015 by the Qatar Museum Authority. The mosque was constructed in the 1940s over the ruins of an older building dating back to the seventeenth century.

Due to the long years of abandonment and negligence and the critical environmental conditions, the external walls, built with natural and local materials, were severely damaged, risking the entire collapse of the structures. The structural consolidation works have adopted reinforced concrete systems and cementitious materials to permit the reuse as a new religious and cultural center. After restoration works, the social aggregation values of the place have been enhanced, and nowadays the people share social spaces and meet in the same way in wish used to happen in the old past, by enhancing the local social attachment values.

In Al- Ain in The United Arab Emirates, in 2017 under the supervision of Abu Dhabi Tourism & Culture Authority, were executed the restoration works of the oldest heritage buildings of the area: the Al Jahili mosque, restored in 2007. Before

the completion of the restoration works, the place was abandoned for many years and subjected to severe damages. The structural consolidation works have brought the mosque to a new life, currently reused as a social place for sharing social and religious life. The reused mosque attracts many tourists, fascinated by the history of the place. (Mazzetto and Petruccioli 2018). All the restoration works of religious buildings have enhancement and the diffusion of cultural knowledge and social cohesion. They have supported the transferring of socio-cultural principles, such as the sense of community belonging and the enhancement of social inclusion by improving the social interactions between people.

5.6 Commercial Reuse of Old Spaces: Enhancement of Economic Growth and Support the Local Economy

In the category for the restoration of commercial heritage sites characterized by constrained environmental conditions, were analyzed three significant projects: the Al Wakrah fishermen village (Fig. 5.6) and the Souq Waqif in Qatar and the Jbeil souq located in Jbeil in Lebanon.

In Qatar, the old fishermen village in Al Wakrah was abandoned for many years, after the oil discovery, becoming an extended urban slum till 2015 when the Qatari Private Engineering Office restored it. After completing the reconstruction and restoration works, the old structures were reused as the new souq in Al Wakrah's. Due to abandonment, many old structures collapsed and were reconstructed by adopting the local constructive style, typology, materials, and construction techniques to reduce pollutions and materials' waste. Today the reused urban places have preserved their old social character with many traditional commercial activities, together with restaurants and cafeterias located in front of the seaside. The social identity of the old village commercial spaces has been safeguarded into the new commercial area of the souq that recalls back the local commercial activities and has supported the local economy by respecting the environmental context.

Another analyzed project in Qatar is the restoration of Souq Waqif in Doha (Fig. 5.7) completed in 2008 thanks Qatari Private Engineering Office. The souq located in the city center of Doha was objected to widespread demolitions, becoming a vast urban slum until the restoration works, started in 2004. The buildings, built before the 1950s, were restored and reconstructed by respecting the traditional typology and use of old materials and construction techniques, such as load-bearing walls done by using sun-dried bricks, gypsum mortar, coral stone, and the wooden beams. It was also adopted the reinforced concrete system to implement the structural stability of the buildings. However, the main restorative aim has been the integration between the past and the contemporary constructive approaches and the traditional architectural style combined with the innovative technologies and systems, which have permitted the

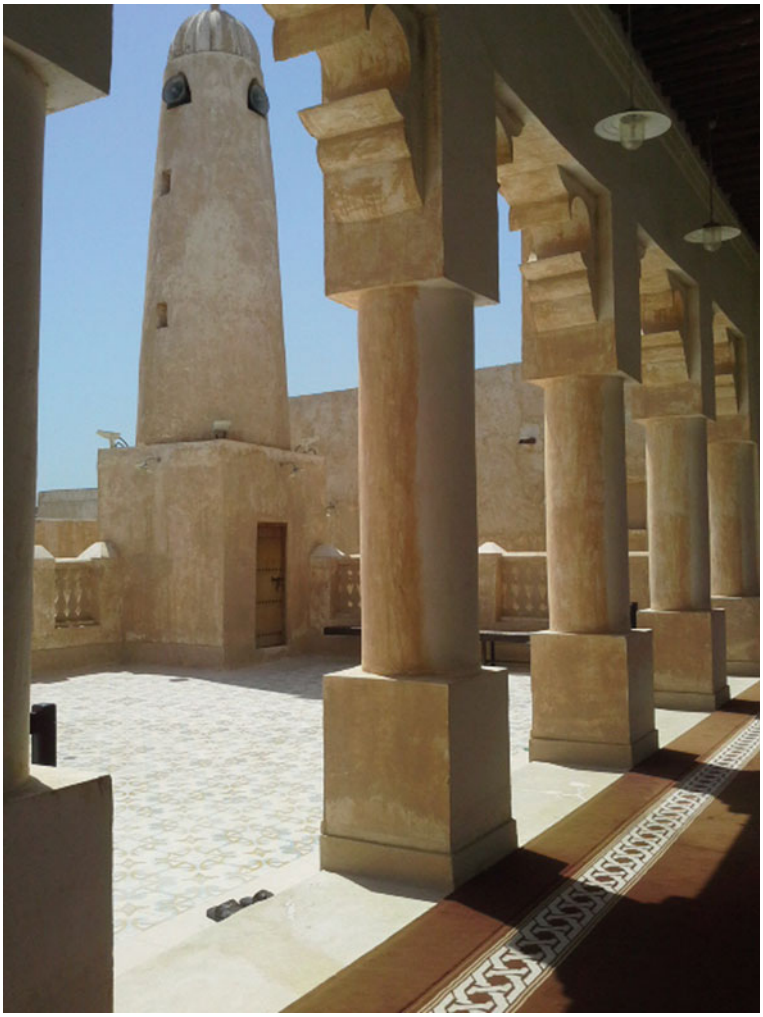

Fig. 5.6 Al Wakrah fishermen village currently reused as the new souq (Credits: author)

respect of the environmental context and the benefit of natural and climatic resources. After the restoration works, Souq Waqif area was has been entirely requalified and hosts an interesting combination of traditional commercial activities, together with many restaurants, cafeterias local shops which have supported the local economic growth and enhanced the appreciation of the rediscovered cultural and commercial values of the site (*souq*) (Mazzetto and Petruccioli 2018).

Fig. 5.7 Souq Waqif in Doha, after the restoration works (Credits: author)

5.7 Natural and Archeological Sites: Landscape Requalification to Respect the Environmental Context

In the Middle East, many interesting restoration projects have recently safeguarded and promoted the environmental aspects of the local context of heritage landscape, for the benefit of the natural and climatic resources. Two presented interventions after

Fig. 5.8 Horsh Beirut Park and the heritage landscape of the pine forest (Credits: author)

the requalification and reuse have brought to light the old values of social cohesion embedded in the areas, together with the enhanced respect for the local environmental context, by showing the site's capability to adapt to the new community needs.

In 1992 started the requalification works and landscape redesign project for the well-known urban park "Horsh Beirut" (Fig. 5.8), financed and supervised by the Municipality of Beirut in together with the Council of Île-de-France,

The park is a landscape heritage site of a pine forest extended over 300,000 sqm. In past times, the park was invaded and was destroyed by frequent attacks and invasions, by ancient populations such as the Crusaders, Mamluks, Ottomans, it was also bombed and burnt during the World war, and it was lately reconstructed after the Lebanese civil war, after being bombed many times during the fighting. (Shayya 2010). The park opened after the works in 2014 and became an important example of heritage landscape requalification that has improved the quality of the population's life, by offering green oxygen for the Beirut capital. Horsh Beirut Park includes values, such as being an example of a sustainable environment, a space for recreation, a cultural heritage landscape, a space for social gathering and practices, and it has become famous for the Beirut's inhabitants since it is also a symbolic representation of freedom and democracy because it is a public space that "belong to the city."

The restoration works have brought to light the historical distribution of green areas and ancient paths inside the park by respecting a sustainable landscape

design approach. Horsh Beirut's requalification has improved the place's socio-environmental values by respecting the environmental context and has raised the levels of social quality the Beirut inhabitants. The sustainable approach of the intervention has promoted the reduction of pollution and waste by enhancing the values of natural and climatic resources.

Al Zubarah archeological site, in Qatar, in 2009 was included in a specific safeguarding national law to protect the "Heritage Park of Northern Qatar" and the neighborhood where many archeological remains are still visible, and the entire territory of Al Zubarah in 2013 was inscribed on the heritage world list of UNESCO (the United Nations Educational, Scientific and Cultural Organization).

In the old past, around in the eleventh century, Al Zubarah was an important commercial city, but then it was attacked and destroyed by invasions and latterly abandoned at the beginning of the twentieth century. In 2014 some essential archeological excavations discovered the rests of Zubarak's old and vibrant commercial society by bringing to remains of its old culture and society. The conservation project has discovered, cleaned, and protected the foundations' walls of the traditional buildings, such as courtyard houses, palaces, fishermen hunts, commercial souk's areas, defensive walls, and towers. The project intended to protect and prevent any future loss of archeological testimonies of local heritage, methodologies of construction, and adaptation techniques to the constrained environmental context, which is are unique examples of the interaction between humankind and the surrounding natural and environmental conditions. Such outstanding cultural values are still clearly perceived in Al Zubarah archeological heritage park, locals, and tourists every day appreciates the unique remains through the exhibition spaces.

5.8 Comparison of Adaptive Reuse Interventions in a Constrained Environmental Context

The presented analyses of the heritage restoration and reuse projects in the Middle East constrained context, have taken in consideration some different typologies of intervention (defensive structures, residential and religious buildings, commercial areas, landscape, and archeological sites), the scale of interventions (architectural and urban), and the comparison between some principles associated with the adopted criteria of analysis: socio-cultural, socio-economic, socio-environmental.

The intent has been to analyze different reuse projects and understand how sustainable adopted approaches can enhance the cultural, social, and economic values of the nation's heritage. Table 5.1 shows a summary of the categories of intervention analyzed in the restored heritage case studies in the environmentally constrained context, by presenting a brief description of the project, the new function for reusing the heritage structures, buildings and areas, and the governmental institutions involved for the finance and supervision of the works.

Table 5.2 presents each intervention's typology, the value of the adopted principles of analyses inside the criterion of sustainability used for comparing the case study.

Table 5.1 Schematic comparison of the adaptive reuse projects analyzed

Name Place	Date/Institution	Category/Scale	Project description	Type of materials used	Original use	Adaptive reuse	Sustainable principle
Al Jahili Fort Al-Ain UAE	2007/Abu Dhabi Tourism & Culture Authority	Defensive/Architectural	Restoration, consolidation	Natural materials and cement mortar	Defensive structure	Fort Museum	Socio-cultural Environmental
Al Barzan Towers Doha Qatar	2015/Qatar Museum Authority	Defensive/Architectural	Conservation, restoration, consolidation	Natural materials and cement mortar	Defensive structure	Towers Museum	Socio-cultural Environmental
Al ZubarahFort Doha Qatar	2014/Qatar Museum Authority	Defensive/Architectural	Restoration consolidation	Natural materials, limestone rocks, gypsum mortar, wooden poles	Defensive structure	Fort and Cultural Museum	Socio-cultural economic
Al Taghab fort Doha Qatar	1990/Qatar Museum Authority	Defensive/Architectural	Restoration, reconstruction	Natural materials, cement mortar, concrete blocks, and reinforced concrete	Defensive structure	Fort Museum	Socio-cultural

(continued)

Table 5.1 (continued)

Name Place	Date/Institution	Category/Scale	Project description	Type of materials used	Original use	Adaptive reuse	Sustainable principle
Old Amiri Palace Doha Qatar	2015/Qatar Museum Authority Conservation Team	Residential/Architectural	Restoration, Structural consolidation	Natural materials, limestone rubble, wooden poles, and cement mortar, reinforced concrete.	Residential Palace	Museum of the Palace, Qatar National Museum	Socio-cultural
Heritage Houses Doha Qatar	2015/Msheireb Property	Residential/Urban	Restoration, Structural consolidation	Natural materials, limestone rocks, gypsum mortar, wooden poles	Residential quarter	Museums of the culture	Socio-cultural
Al Bastakiya Quarter Dubai UAE	2003/Dubai Municipality	Residential/Urban	Restoration, consolidation	Natural materials, mud, cement mortar.	Residential Quarter	Religious and Cultural Center	Socio-cultural economic

(continued)

Table 5.1 (continued)

Name Place	Date/Institution	Category/Scale	Project description	Type of materials used	Original use	Adaptive reuse	Sustainable principle
Saifi Village Beirut Lebanon	2014/Le Solidere	Residential/Urban	Reconstruction	Cement mortar, concrete, reinforced concrete	Residential neighborhood	Luxury residential	Socio-cultural economic
Old Sana'a Settlement Yemen	1995/General Organization Preservation Historic Cities	Residential/Urban	Restoration, consolidation	Natural materials, wooden poles, stone blocks	Residential Settlement	Residential, museums, exhibitions	Socio-cultural economic environmental
Al Dakkira Mosque Doha Qatar	2015/Private Engineering Office	Religious/Architectural	Restoration, consolidation	Natural materials, wooden poles cement mortar,	Mosque	Mosque, religious center	Socio-cultural
Al Ruwais Mosque Doha Qatar	2015/Qatar Museum Authority	Religious/Architectural	Restoration, consolidation	Natural materials, mud, wooden poles, cement mortar	Mosque	Mosque, religious center	Socio-cultural

(continued)

Table 5.1 (continued)

Name Place	Date/Institution	Category/Scale	Project description	Type of materials used	Original use	Adaptive reuse	Sustainable principle
Al Jahili Mosque Al-Ain UAE	2007/Abu Dhabi Tourism & Culture Authority	Religious/Architectural	Restoration, consolidation	Natural materials, cement mortar-	Mosque	Mosque	Socio-cultural
Al Wakrah Souq Doha Qatar	2015/Private Engineering Office	Commercial/Urban	Restoration, reconstruction	Natural materials, cement mortar, wooden poles concrete blocks, and reinforced concrete	Fishermen Village	New Souq, commercial, entertainment	Socio-cultural economic environmental
Souq Waqif Doha Qatar	2006/Private Engineering Office	Commercial/Urban	Restoration, reconstruction	Natural materials, cement mortar, wooden poles concrete blocks, and reinforced concrete	Old souq	Souq, commercial, entertainment	Socio-cultural economic environmental

(continued)

Table 5.1 (continued)

Name Place	Date/Institution	Category/Scale	Project description	Type of materials used	Original use	Adaptive reuse	Sustainable principle
Horsh Beirut Lebanon	2014/Municipality of Beirut	Landscape/Urban	Conservation	Natural materials, wooden poles, stone blocks	Pine forest	Urban Park	Socio-cultural, environmental
Al Zubarah Archeological Site Doha Qatar		Archeological-Landscape/Urban	Conservation	Natural materials, mud	Settlement	Archeological, open-air museum	Socio-cultural, environmental

Table 5.2 Schematic comparison of areas and principles of sustainability used for assessing the restoration projects. The legend shows the scores achieved from each project during the assessment phase

		Defensive Structure				Residential buildings					Religious buildings			Commercial areas		Natural sites	
Areas of sustainability	Principles of sustainability LEGEND A = for the maximum score (8–10 points) B = for the average score (4–7 points) C = for the low score (0–4 points)	Al Jahili Fort	Al Barzan Towers	Al Zubarah Fort	Al Taghab Fort	Amiri Palace	Heritage Houses	Al Bastakiya quarter	Saifi Village	Old Sana'a Settlement	Al Dakkira Mosque	Al Ruwais Mosque	Al Jahili Mosque	Souq Al Wakrah	Souq Waqif	Horsh Beirut	Al Zubarah archeology
Socio-cultural sustainability	1. To enhance the social inclusion	A	B	C	B	B	B	A	B	A	B	B	B	A	A	C	B
	2. To promote cultural diversity	B	B	C	B	B	A	A	B	A	B	B	B	B	A	C	C
	3. To discover personal and community belonging	A	A	A	A	A	A	B	B	A	A	A	A	A	A	B	A
	4. To enhance social attachment	A	A	A	A	A	A	A	B	A	A	A	A	A	A	B	A

(continued)

Table 5.2 (continued)

		Defensive Structure				Residential buildings					Religious buildings			Commercial areas		Natural sites	
Areas of sustainability	Principles of sustainability LEGEND A = for the maximum score (8–10 points) B = for the average score (4–7 points) C = for the low score (0–4 points)	Al Jahili Fort	Al Barzan Towers	Al Zubarah Fort	Al Taghab Fort	Amiri Palace	Heritage Houses	Al Bastakiya quarter	Saifi Village	Old Sana'a Settlement	Al Dakkira Mosque	Al Ruwais Mosque	Al Jahili Mosque	Souq Al Wakrah	Souq Waqif	Horsh Beirut	Al Zubarah archeology
	5. To improve appreciation of cultural values	A	A	B	A	A	A	A	B	B	A	A	A	B	B	B	B
	6. To improve the quality of labors' working conditions	C	C	C	C	C	C	C	B	B	C	C	C	C	C	B	C

(continued)

Table 5.2 (continued)

		Defensive Structure				Residential buildings					Religious buildings			Commercial areas		Natural sites	
Areas of sustainability	Principles of sustainability LEGEND A = for the maximum score (8–10 points) B = for the average score (4–7 points) C = for the low score (0–4 points)	Al Jahili Fort	Al Barzan Towers	Al Zubarah Fort	Al Taghab Fort	Amiri Palace	Heritage Houses	Al Bastakiya quarter	Saifi Village	Old Sana'a Settlement	Al Dakkira Mosque	Al Ruwais Mosque	Al Jahili Mosque	Souq Al Wakrah	Souq Waqif	Horsh Beirut	Al Zubarah archeology
Economic sustainability	7. To improve the highest social values	B	B	A	A	A	B	B	C	B	B	B	B	A	A	B	A
	8. To enhance economic growth	B	B	C	B	B	B	B	B	A	B	B	B	B	A	B	B
	9. To support the local economy	B	B	B	B	A	B	B	B	B	B	B	B	B	B	C	B

(continued)

Table 5.2 (continued)

		Defensive Structure				Residential buildings					Religious buildings			Commercial areas		Natural sites	
Areas of sustainability	Principles of sustainability LEGEND A = for the maximum score (8–10 points) B = for the average score (4–7 points) C = for the low score (0–4 points)	Al Jahili Fort	Al Barzan Towers	Al Zubarah Fort	Al Taghab Fort	Amiri Palace	Heritage Houses	Al Bastakiya quarter	Saifi Village	Old Sana'a Settlement	Al Dakkira Mosque	Al Ruwais Mosque	Al Jahili Mosque	Souq Al Wakrah	Souq Waqif	Horsh Beirut	Al Zubarah archeology
Environmental sustainability	10. To respect the environmental context	B	B	A	B	B	B	A	C	C	B	B	B	C	C	A	A
	11. For the benefit of natural and climatic resources	B	B	A	A	C	B	C	C	B	B	B	B	C	B	A	A

(continued)

Table 5.2 (continued)

		Defensive Structure				Residential buildings					Religious buildings			Commercial areas		Natural sites	
Areas of sustainability	Principles of sustainability LEGEND A = for the maximum score (8–10 points) B = for the average score (4–7 points) C = for the low score (0–4 points)	Al Jahili Fort	Al Barzan Towers	Al Zubarah Fort	Al Taghab Fort	Amiri Palace	Heritage Houses	Al Bastakiya quarter	Saifi Village	Old Sana'a Settlement	Al Dakkira Mosque	Al Ruwais Mosque	Al Jahili Mosque	Souq Al Wakrah	Souq Waqif	Horsh Beirut	Al Zubarah archeology
	12. To reduce pollution and materials' waste	B	B	A	B	B	B	C	C	C	B	B	B	B	C	B	A
	13. To minimize the climatic changes	B	B	A	B	B	B	B	B	B	B	B	B	B	B	A	A
	14. To reduce the natural hazard effects	C	B	A	B	C	C	B	B	B	B	B	B	B	C	A	A

Many different elements have been considered while analyzing the projects such as the environmental aspects, the context of the historical heritage, the links with the traditions, the transmission of environmental, cultural and social values, the new buildings' functions, as well as the enhancement of the historic values pertaining to the restored heritage.

The research aims to enhance the interest in safeguarding the local heritage that has been neglected and abandoned for many years by discovering that its sustainable reuse can improve the local cultural and social and environmental values by contributing to the construction of the national identity of many growing countries.

In the contemporary social development of emerging countries of the Middle East area is of fundamental importance to adopt a sustainable approach to the restoration of the heritage to enhance the local culture and the appreciation of the national identity.

The results show that there are many elements in common between the safeguard of nation's heritage, the reuse of ancient natural materials and techniques of construction, the promotion of local cultural values, synergy with the context, the heritage resilience, the adaptation to the climate over the centuries, that must be compatible with the buildings reuse, and with the constrained environmental conditions. Therefore, the concept of sustainability is presented and in a full meaning of unity and harmony, by reducing material waste, enhancing the respect for the ecosystem, improve the highest social values, the appreciation of cultural aspects, support the local economy, the promotion of economic growth, and the enhancement of the sense of community belonging together with the need to promote the cultural diversity. The aim is to define a persistent approach in the heritage restoration and reuse, capable of enhancing the Middle East culture, by respecting sustainability and constrained environmental conditions.

Finally, in the light of the need to enhance international information exchange and cooperation, it is essential to improve the current dialogue between ministries, universities, and professional associations by involving other public or private partners and encouraging the formation of the Middle East Restoration Philosophy.

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Part II
Attracting Business with Local Frameworks

Chapter 6
Ecotourism Industry in Constrained Environments: Bhutan as a Case Study

Simona Azzali, He Qingyao, Shen Tianhui, Li Xinyi, and Jiang Qifeng

Abstract This chapter analyses the current situation of tourism in Bhutan and discusses the opportunities and challenges of ecotourism in this country. It combines Bhutan's tourist data, the current tourism policy of the Bhutanese government and the government's measures for culture and environmental protection, exploring the potential development methods to improve and maintain the sustainability of Bhutan's natural and cultural environment by enhancing its ecotourism industry. Furthermore, it also enumerates the adverse effects of over-exploration of tourism in other cities such as Nepal with respect to the importance of ecotourism. A multi-layered qualitative research methodology was conducted to determine whether citizens and visitors are in favour of ecotourism activities that might benefit local communities and cultures. It can be concluded that the development of ecotourism is conducive to improving and maintaining the sustainability of Bhutan's natural and cultural environment. Finally, this research ends by providing key recommendations to promote the development of ecotourism to protect Bhutanese people and the country's Gross National Happiness.

Keywords Bhutan · Constrained tropical environments · Ecotourism industry · Gross National Happiness · Sustainability · Sustainable tourism

6.1 Introduction

In the past few decades, with the development of globalization, the number of international tourists has increased significantly, and tourism industries of all countries in the world have also developed rapidly in terms of competition and cooperation. The development of the tourism industry not only promotes regional economic growth but also has a profound influence on social development and progress, natural ecological protection and utilization and the spread and inheritance of world culture. As the country with the highest national happiness in the world, the development of the

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tourism industry is slowly changing the political, economic and cultural status of Bhutan.

Bhutan is a landlocked country between India and China, in Himalayas. Due to the high and low altitude differences and the low latitude, the country has a variety of terrain types, diverse climates and rich natural landscapes which form its attractive and unique natural tourism resources. Bhutan's high mountains and forests, the dangerous peaks and glaciers are widely distributed, the colourful prayers are on the wind, and the silvery snow peaks stand tall against the blue sky, which accurately explains the Shangri-La Tibetan Buddhism's complete overview of the wonderland (Fraser and Bhattacharya 2001). In addition to the available adventure and mountaineering facilities, Bhutan is said to be a place of desire. For example, Bhutan's Manas Wildlife Sanctuary and Raya Wildlife Sanctuary have abundant precious wildlife which make them great tourist attractions (Dorji 2001). Bhutan is also one of the most environmentally conscious countries in the world. It is known as the *last Shangri-La on the earth* and *People's Pure Land*. It has the reputation of being the farthest from the world and the closest to the blue sky.

Ecotourism is a form of tourism that involves access to fragile, primitive and relatively undisturbed natural areas that is designed to be a low impact and often small-scale alternative to standard commercial mass tourism. This entails travelling responsibly to natural areas, protecting the environment and improving the well-being of local people. Often, ecotourism involves interactions with biological components of the natural environment. Ecotourism focuses on socially responsible travel, personal growth and environmental sustainability. Ecotourism usually involves locations with diverse plants, animals and cultural heritage as destinations and major attractions. Ecotourism aims to inform visitors about the impact of humans on the environment and to promote a greater appreciation of our natural habitats (Fennell 2007). Barnett et al. (2015) noted three equally important pillars of sustainability needed for ecotourism: sociocultural, environmental and economic. By focusing on all the three pillars of sustainability it is possible to develop forms of effective and sustainable ecotourism. Inevitably, issues will arise throughout the creation of any ecotourism plan. Therefore, it is important to realize that this is not a one size fits all plan approach but any plan should be used and modified to fit individual situations. Ecotourism models include both short term strategies as well as long-term capacity building. If all of this is done, ecotourism can provide mutual benefits to tourists, local people and the environment.

Bhutan's tourism industry is relatively young. In the recent years, the Royal Government of Bhutan has been focusing on the development of the tourism industry and has introduced several favourable policies including the establishment of the Bhutan Tourism Bureau. At the same time, however, to prevent the tourism industry from destroying the ecological environment of the country and the unique Buddhist culture and traditions, the development of tourism has been gradual. Therefore, it is necessary to study the relationship between tourism and landscape in the constrained environment of Bhutan. Through this study, we analyse the coordination between the tourism industry and ecological environment construction, provide a baseline for the development of local tourism and provide recommendations for the sustainable

development of international tourism in Bhutan. Furthermore, this study has important referential significance for other cities aiming to build and grow an ecotourism industry and achieve sustainable development for the economy, society and the environment, creating a win-win situation.

6.2 Literature Review

6.2.1 The Threats of International Tourism Growth

According to Gross (2018), the reason tourism has been growing rapidly in the last decades is due to the expansion of budget airlines, the spread of online services which give tourists easy access to travelling information as well as the sharing of travel photos on social media. Over the past five years, global tourism expenditure has nearly doubled, increasing from 2.5 to 4.7 trillion USD (Gross 2018). Indeed, the development of the tourism industry can bring more revenue to local communities and boost their economic growth. However, simultaneously, these economic benefits caused by increased tourism have been paralleled by a series of negative impacts on both the natural and the cultural environment. We can highlight five major cases: changes in land use and land cover, energy consumption, biotic exchange and the extinction of wild species, exchange and dispersion of diseases and changes in the understanding of the environment. Furthermore, water consumption should also be considered a serious issue as many countries are facing water scarcity problems (Gössling 2002). Thus, the tense relationship between tourism and the environment has accrued worldwide attention. In many cities such as Venice, Barcelona, Bangkok, Phuket and Bali, excess tourism has badly influenced both the natural and the built environment. For example, tourism activities have had negative impacts on the environmental sustainability of Pattaya beach and other coastal areas of Thailand (Khan 2017), leading to soil erosion, sedimentation, water pollution, garbage waste pollution and noise and air pollution. Another example is Antarctica, which has a pristine but vulnerable ecosystem. Antarctica tourism has brought a lot of environmental changes which are connected to many factors such as energy consumption, land use, waste generation, biotic diseases (Kariminia et al. 2013).

The growth of international tourism also increases the potential for social problems and cultural clashes, especially in the East, where exposure to a large number of Western tourists has further eroded traditional cultures. Sanjay Nepal (2002) found that in the Everest region of Nepal, young Sherpas increasingly imitate the habits and behaviours of Western tourists, including drug use. Furthermore, such cultural erosion has spread to religious sectors as well. The level of monastic activity has decreased in tourist-heavy areas, one of the reasons being that monks often become involved with the tourism industry to earn more money. Consequently, to face the potential damages caused by a rapid tourism growth, the World Tourism Organization

(WTO) has been promoting forms of more sustainable and responsible tourism (Gross 2018).

6.2.2 Bhutan Tourism Characteristics

In 1972, the King of Bhutan, Jigme Singh Wangchuck, proposed the concept of Gross National Happiness (GNH). GNH encourages the government administration to increase overall happiness of citizens and focus on the balanced development of the material and spiritual. GNH has been regarded as the national welfare index of Bhutan. It is measured in nine categories including the four pillars of GNH: sustainable and equitable socio-economic development, environmental conservation, preservation and promotion of culture and good governance (GNH Commission 2009). Recently, due to economic development and the influx of more tourists from all over the world, Bhutan's national characteristics and traditional culture face various challenges. Propagating the traditional culture of Bhutan is an important policy principle of the country's governance. In the modernization of GNH, Bhutan often quoted the traditional concepts of Buddhism to cooperate. However, as more and more tourists set foot on Bhutan's land, many of its original customs become impacted by foreign cultures, including cultural constructions such as language and religion (Schmidt 2017). The prosperity of tourism seems to be good for Bhutan's economy, but for the Bhutanese, the growth of GDP needs to be balanced with the growth of GNH. Therefore, educate tourists in low numbers is the gold rule of the Bhutanese government on the development of tourism. On the one hand, the visitors' deep understanding of culture and traditions will enable them to cherish and protect tourist attractions. On the other hand, by reasonably promoting the development of tourism without affecting the lifestyle of the locals, the local people can maximize the benefits of tourism (drukasia.com 2019).

6.2.3 The Value of Ecotourism for Bhutan

Ecotourism is another option to reduce the interference and impact of mass tourism on the natural environment, aiming to protect the ecological environment while improving general well-being (Das and Chatterjee 2015). There is a symbiotic relationship between natural resource protection and ecotourism (Boley and Green 2016). Ecotourism seeks to develop the tourism industry to improve the economy while minimizing its impact on the natural environment. At the same time, natural resources are also used as a driving force for the realization of the foundation of ecotourism and related economic interests. Environmental protection plays a significant role in Bhutan's tourism policy and is one of the four cornerstones of the country's development philosophy, the Gross National Happiness (GNH Commission 2009). For example, the Bhutanese Constitution stipulates that the country's forest coverage

must never be less than 60% (Zurick 2006). Therefore, ecotourism as an environment-friendly industry can help Bhutan better protect its local environment compared to other types of industries. Moreover, ecotourism is conducive to improving the livelihoods of sustainable development in the natural reserves of Bhutan. As suggested by Montes and Kafley (2019), ecotourism discourse in Bhutan is driven through appeals to Gross National Happiness (GNH) and Sustainable Development. As a niche market, ecotourism has its unique characteristics and the potential to balance the economic development and nature protection of rural communities (Wood 2002). First, it can provide non-agricultural employment opportunities and expand farmers' sustainable livelihoods. The increase in income will help invest in more environmental protection projects (Gurung and Seeland 2011). Second, with the right leadership and the right scale, ecotourism has the potential to help protect the biodiversity by providing strong economic incentives for conservation that exceed the cost of land conversion opportunities for other consumer uses (Boley and Green 2016). This suggests that ecotourism can potentially bring significant economic growth to Bhutan. It can be deduced from the above conclusions that the development of ecotourism and nature conservation has a symbiotic relationship, and the market and economic benefits brought by ecotourism also contribute to the sustainable development of nature conservation. Therefore, the development of ecotourism in Bhutan is conducive to the sustainable development of nature conservation.

6.3 Methodology

Qualitative analysis was conducted in this research and based on two data sources to gain an in-depth understanding on the aspects of tourism in Bhutan that attract tourists and to analyse the possibility of tourism development in Bhutan from the demand perspective. Firstly, data source was the analysis of the Bhutan Tourism website and data and reports available on the website. Through the economics of the transaction and the data provided by the Bhutan Tourism website, the economic effects and employment opportunities brought by Bhutan's tourism development over the past 10 years were analysed and compared with the international average. Then, through an analysis of the 2012 Statistical Yearbook of the Bhutan National Bureau of Statistics, the researchers studied the Bhutanese government's initiatives on sustainable development policies and cultural industries. With the integration of the aforementioned data, the researchers were able to understand Bhutan's tourism development path and its economic achievements. More importantly, the researchers attempted to understand the significant factors affecting the development of tourism in Bhutan by interpreting the official report data, thereby providing a theoretical basis for the next development proposal.

Secondly, the researchers selected Nepal, which is similar in location to Bhutan, as a case study. Through the official tourism website of Nepal, the impact of tourism on the local economy, culture and environment was studied. The study's purpose was to use the experience of Nepal's tourism industry to predict the problems that Bhutan's

tourism development might encounter. At the same time, the successful ecotourism projects in Nepal were analysed to provide positive guidance for Bhutan's ecotourism.

6.4 Data Analysis

6.4.1 Analysis of Tourism Volume and Tourism Habits in Bhutan

According to the WTO's 2015 international tourist arrival data, the number of visitors to Bhutan was 155,000, and the country's tourist ranking was 156th worldwide (indexmundi.com 2015). This number is due to the Bhutanese government's very strict entry requirements for tourists. All travel agencies operating in the country must obtain permission and approval from the Bhutanese government. Visitors must pay Bhutan's daily tourist tariffs (200US$ in low season or US$250/day in high season) which include entry fees, hotel accommodation, food, Bhutan transportation and licensed tour guides. On the one hand, the higher tourist fees exceed the budgets of many tourists, leading the number of tourists in Bhutan to be relatively low, while on the other hand, the high fees also guarantees the kind of visitors. Visitors willing to choose Bhutan are indeed attracted by its local characteristics.

According to the Bhutan Tourism Monitor Data released by the Tourism Council of Bhutan in 2018, the number of Bhutanese tourists from all over the world increased to 274,097, an increase of 7.61% compared to the number of tourists in 2017 (Bhutan, Tourism Council 2018). The Indian market is the primary source of Bhutan's tourism industry, which accounted for 69.99% of the country's tourism in 2018. Because India and Bhutan cooperate both politically and economically, Indian tourists do not need to pay any daily tourist tariffs and are free to enter and leave Bhutan without a visa. The number of tourists from the United States, Britain, Germany and other Western and Asian countries has also increased year by year (Table 6.1).

Bhutan's tourism data also indicates that most visitors to Bhutan have received a good education and have stable income jobs of which 89.88% have a bachelor's degree or higher (Figs. 6.1 and 6.2). This implies that most visitors to Bhutan should have the ability to regulate their own behaviour during the travel process, will consciously protect the local ecological environment and biodiversity as well as reduce man-made damage caused when enjoying local landscapes and traditional features. The tourism effect's impact on environmental conditions of tourist areas cannot be ignored, and in a similar way, tourist behaviour should also be considered with respect to the ecological environment of tourist destinations (Fig. 6.3). Therefore, well-educated tourists play an important role in promoting the development of ecotourism in Bhutan. During their travel, well-educated travellers can understand the importance of long-term interests of human beings and better enjoyment of nature and local culture. They are more willing to accept some of the measures

Table 6.1 Major source markets by nationality

Countries	Total	% shared
India	191,836	69.99
USA	10,561	3.85
Bangladesh	10,450	3.81
China	6878	2.51
Singapore	3886	1.42
Thailand	3886	1.42
UK	3585	1.31
Germany	3422	1.25
Malaysia	3140	1.15
Japan	2674	0.98
Vietnam	1961	0.72

Data source Bhutan, Tourism Council 2018

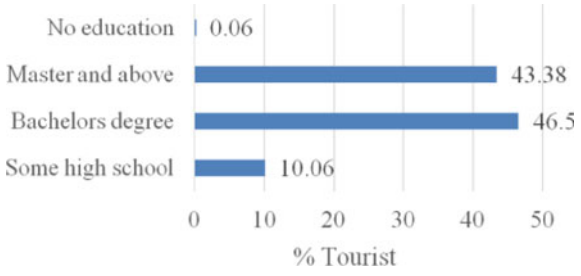

Fig. 6.1 Tourists and their level of education (*Data source* Bhutan, Tourism Council 2018)

Fig. 6.2 Tourists and employment status (*Data source* Bhutan, Tourism Council 2018)

by the government to maintain the ecological environment, and they can also guide people around them to avoid harmful activities and local traditional misconduct.

It is generally more complicated and difficult for foreigners to travel to Bhutan compared to travelling to other Asian countries. For instance, all people from foreign countries, with the exception of India, need to apply for a visa to visit Bhutan and travel with tour guides and drivers assigned by local agents.

Fig. 6.3 Example of signage along a tourist trail in West Bhutan (photo by authors)

Despite Bhutan's less developed conditions compared to other tourism destinations, tourists still find something very attractive about the country and tend to enjoy their experience when visiting it. What attracts them most about Bhutan is its historical background, natural (Fig. 6.4) and beautiful locations (Figs. 6.5 and 6.6) as well as the nice and friendly local people. To foreigners, Bhutan is a unique country that

Fig. 6.4 The beauty of nature in Bhutan (photo by authors)

arouses their interest to discover the true beauty of nature and the way of life in a landlocked country.

When people are choosing a tourist destination, the most concerning factor is the diversity of attractions. Additional factors include location, ambience, accommodation quality, food quality and security. People are more willing to choose a place

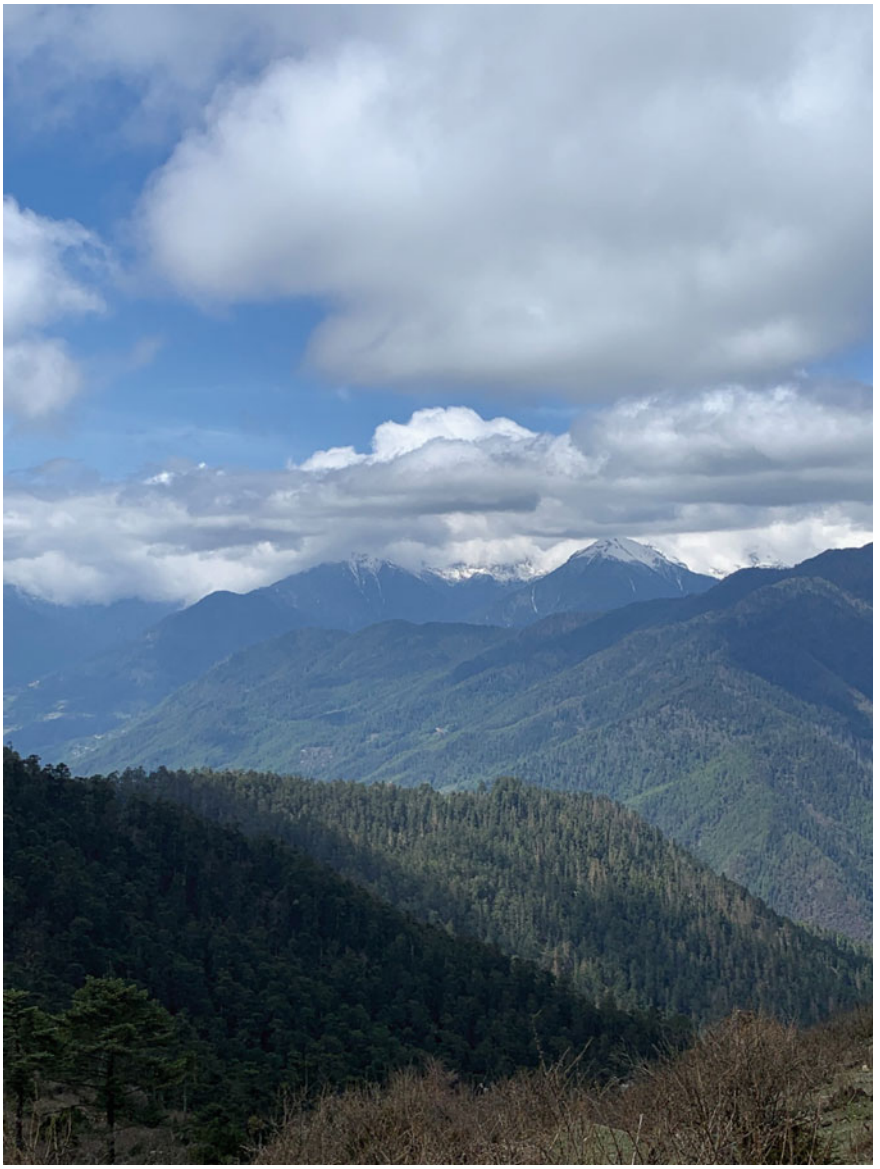

Fig. 6.5 A panoramic view of Bhutan (photo by authors)

which can benefit the local community with increased awareness of negative impacts caused by mass tourism. Ecotourism is a good way to combine the desire to travel and at the same time protect the local environment.

One of the purposes of developing ecotourism is indeed to prevent the commercialization and vulgarization of Bhutan while developing and utilizing tourism resources.

Fig. 6.6 An example of traditional Bhutanese architecture (photo by authors)

Developing ecotourism would also help maintain the original form and pure essence of Bhutan's traditional culture as much as possible. March, April and October are the primary months for most visitors to visit Bhutan because most of the cultural and religious festivals are held in these months. Regarding festivals, Thimphu and Paro Tsechu were found to be the most visited sites with 20% and 32% visit rates,

respectively (Bhutan, Tourism Council 2018). During the festival, visitors can watch dances and ceremonies made by monks and locals to experience the unique life and culture of Bhutan. About 86.41% of the tourists who chose Bhutan as a travel destination were attracted by the local cultural history of Bhutan, which is in line with Bhutan's tourist attractions featuring traditional festivals and folk rituals (Bhutan, Tourism Council 2018).

Most international visitors currently use scheduled flights as a means of transportation to enter and exit Bhutan and while cars and buses occupy most of Bhutan's public transportation, international tourists are not allowed to rent cars or to drive in Bhutan. Tourists' transportation is included in the daily travel tariffs inclusive of a driver and a guide. Only locals, residents and Indian tourists can take buses. In general, an increase in the number of tourists will lead to an increase in demand for transportation. While the government could build more roads and provide more transportation to meet the needs of tourists, road construction could damage the local natural environment, and increase in the number of vehicles will also lead to more air pollution. The Bhutanese government's restrictions on tourism travel effectively control the urban traffic pressure brought by the increase in the number of tourists and additionally slow down the over-exploitation of the natural environment.

6.4.2 Government Policy of Bhutan

The tourism industry policy adopted by Bhutan follows the principle of high value and low impact. As apparent from Table 6.2, the government of Bhutan's focus on tourism development is divided into four areas: sustainable and equitable socio-economic development, maintenance and promotion of culture, environmental protection and its sustainable development, and strengthening of tourism industry governance (Tenzin et al. 2016). It can be inferred that Bhutan's tourism industry is based on the principle of sustainability and must be environment-friendly, socially and culturally acceptable and economically viable.

6.4.3 Sustainable Development

The Government of Bhutan wants to maintain a balance between economic growth and environmental and cultural protection. From the performance indicators of Table 6.2, it is evident that there are three main reasons for the local government to promote the tourism industry. The first reason is to increase national income (GDP), thereby contributing to the improvement of rural communities and bringing benefits to the local population. The second reason is to enhance the international influence of the Bhutanese state and to preach to the outside world the unique culture

Table 6.2 Key tourism indicators for Bhutan

GNH pillars	Sector key results areas	Key performance indicators (outcomes)
Key objectives—Promote Bhutan as high end high value low impact destination		
Sustainable and equitable socio-economic development	Improved Service Delivery	Tourist arrival (no/pa)
		Tourist satisfied with visit
	New products developed	No. of new products (wellness, cultural, MICE, community-based tourism, ecotourism,)
		% of tourism visiting East, South and Central circuits > 50%
	Contribution to GDP, Revenue and Employment increased	Contribution to GDP (US$ m)
		No. of Bhutanese employed
		Yield per tourist/night (US$)
Preservation and promotion of culture	Bhutanese culture and tradition promoted among visitors	% of tourism on cultural tours
		Growth in sale of handicraft products
Conservation & sustainable environment	Enhance effectiveness and efficiency in delivery of public service	TAT for public services reduced
		Anticorruption Strategy implemented
		Average performance rating (Govt. Performance Management System)

Source Tenzin et al. 2016

and traditions of Bhutan, which are different from those on the South Asia sub-continent. The final reason is to promote the socio-economic development of Bhutan and increase the number of jobs (Tenzin et al. 2016). However, the government of Bhutan is concerned that having unrestricted foreign visitors will have a negative impact on the social and natural environment of the country. This is important to the government after taking Bhutan's pristine environment and the impact of its rich and unique culture into consideration (Nyaupane and Timothy 2010). As a result, the government exercises macro-control over the type and number of tourists, and the number of visitors has been maintained at a manageable level. In 1974, Bhutan began to open up to tourists from all over the world but prior to 2006, the Government of Bhutan had entered a quota of 6000 persons per year for foreign tourists (Dorji 2001). Today, there is no limit on the total number of visitors, but the government attempts to limit the number of tourists entering the country by imposing high daily tourist rates. However, the overall number of visitors to Bhutan has increased over the last few years. For example, in 2018, the number of annual visitors reached 274,097,

an increase of 7.61% compared to 2017 (Tradingeconomics 2019). Moreover, the Government of Bhutan is actively promoting the development of local infrastructures. For example, $1 million from the government budget for 2011–2012 was allocated to the construction of tourism-related infrastructure including roads, hotels and tourism information services (Bhutan, Tourism Council 2012).

6.4.4 Standardization of Tourism

To ensure the legal compliance of the local tourism private sector, the Government of Bhutan has continuously adjusted the development of the overall tourism industry. In 1974, the Bhutan Tourism Cooperation Corporation was established as a state-owned enterprise and privatized in 1991 (Brunet et al. 2001). The company was restructured into the National Tourism Administration and was affiliated with the Ministry of Trade and Industry of Bhutan. The administration was responsible for the formulation of tourism policies, management of tour operators, management of tourist areas, visa issuance and entry control of inbound tourists and the planning and development of tourism resources. The Bhutan Association of Tourist Operators, a cooperative mechanism for self-control and self-regulation of tour operators, was established in December 1999 with the overall objective of bringing together all private sectors in the interests of tourism (Brunet et al. 2001). The Tourism Development Fund was established in 1999, with tour operators charging 10 USD per passenger. The fund is used for the maintenance of tourism infrastructure, joint marketing programmes and the development of new tourism products, ecotourism and adventure sports such as rafting and kayaking (Brunet et al. 2001). The Bhutan Tourism Development Committee, consisting of 12 members from government agencies and the private sector, has several functions, including monitoring of all tourism-related matters as the highest body, providing advice and guidance to the Ministry of Tourism and approving, with other relevant bodies, plans and programmes developed by the Ministry of Tourism (Dorji 2001).

To summarize, the development of Bhutan's tourism industry is both a challenge and an opportunity. Even now, Bhutan's tourism policy still limits the process of its industrial development, and the Government of Bhutan has recognized that tourism is a worldwide phenomenon and an important means of achieving socio-economic development. Moreover, apart from providing travel opportunities, tourism also helps promote a deeper understanding among people and strengthen friendships based on a deeper appreciation and respect for different cultures and lifestyles. The Government of Bhutan has gradually standardized local tourism and expects that over time, they will introduce more policies to open up the tourism market. Alternatively, it will be committed to developing industries that can sustain the growth of economic and ecological balance such as the ecotourism industry.

6.5 Case Study

Nepal, like Bhutan, has the title of a mountain kingdom between the Ganges River basin in India and the Tibetan Plateau in China. Due to the constrained geographical environment, the overall economic development is more backwards compared to the rest of the world. In fact, 80% of the population is engaged in agricultural production, and the total agricultural output value accounts for about 40% of the GDP (Matin et al. 2017). In the past ten years, Nepal has adopted a market-oriented free economic policy and vigorously developed tourism, which has produced better economic benefits and improved the living standards of local people (Forbes 2018). The tourism industry in Nepal accounts for about 10% of Nepal's gross national product. The primary tourist projects in Nepal are mountain climbing (mainly Mount Everest), rafting and mountain biking and hiking. These popular projects have also become the chief culprits of environmental pollution (van Strien 2018). However, the tourism industry has also progressively negatively impacted the local environment and Nepali people. Thus, this paper aims to provide a certain reference for the construction of ecotourism in Bhutan through a simple analysis of the development of tourism in Nepal.

The World Travel and Tourism Committee (WTTC 2018) in its 2018 Travel and Tourism Economic Impact Report highlighted that in 2017, Nepal's tourism industry directly contributed 998 billion rupees to its GDP, accounting for 940,000 tourists signifying a year-on-year increase of 24.86%. Indirect job creation was 1.02 million, and the job and employment contribution ranked 110th and 34th, respectively among 185 countries. The development of tourism has also accelerated the construction of infrastructure and the modernization of hotels, transportation and other facilities, which has greatly enhanced the gross national product. However, with the development of tourism, more and more local people are now engaged in the service industry. Although the manual products industry has increased the income of some local residents, it has significantly affected agriculture. Starting in 2017, the growth of agricultural output in Nepal has almost stagnated (Haan and Desai 2019). This phenomenon has also brought considerable disparity between the rich and the poor.

6.5.1 Loss of Traditional Culture and Environmental Impact

The young Sherpa is a symbol of the persevering character of the Nepalese people, but with the development of tourism and the infiltration of Western culture, young Nepalese people are becoming more eager to emulate the Western way of life. The famous documentary Sherpa is the call for the Sherpa's self-consciousness. Nepal is a big Buddhist country that believes in its culture, but nowadays, Nepal is full of people begging at tourist attractions and most of them are minors. The government needs to let more people enjoy the benefits brought by the development of tourism. The loss of traditional cultural heritage has also manifested in the smuggling of various artworks to be sold in the international art market. The Zhangmu Port at the

junction of China and Nepal has become a route for all kinds of smuggled goods. Due to the lack of control over the entry and exit of tourists by the local government, many smugglers hire local farmers to transport valuable wood and sculpture art out of the country in the name of tourism (Murton 2017).

The climbing peak has become a label for Nepalese tourism, but numerous of mountaineers and hikers are threatening the ecological stability of the entire region. According to Joshi and Dahal (2019), mountain climbers spend an average of about 10,000 to 20,000 Nepalese rupees per day. Although the local economic income has increased, most of the mountaineering equipment purchased for expeditions ends up abandoned on the mountain road. Due to topographical factors, this garbage is difficult to transport down the mountain and can only be burned or buried which significantly pollutes the original ecological environment. At the same time, population density has increased; there is an over-reliance on wood as fuel and building materials, and there is currently overgrazing on hillsides for raising livestock. According to estimates by the Nepalese government, tourism accounts for 10% of the increase in wood consumption, which has led to the loss of 240 million cubic meters of mountain surface soil in Mount Everest each year, further exacerbating the depletion of forest resources (Ogino et al. 2019).

6.5.2 Annapurna Conservation Area Project

The Annapurna Conservation Area Project in Nepal's tourism industry is the most typical successful combination of tourism development and environmental protection. There are many measures that Bhutan can learn from the project. It takes nearly three weeks to trek around the Annapurna peak. For those who participate in this event, each person will be charged INR 2000, equivalent to 24 Euros. The money goes into the fund for the Annapurna Conservation Area Project to support the protection of the ecological environment and the humanities. For example, the construction of small hydropower stations and the development of alternative energy sources have seen significant changes in the Annapurna area since the implementation of the project. A small hydropower station was built here, supplying electricity, as well as a drinking water supply station powered by electricity. In reviewing this history, Project Director Guendra said that they had involved residents in the project from the very beginning, and have closely linked environmental protection and development, thus gaining the support of residents (KC et al. 2015).

The project staff planted trees, developed alternative energy sources, built sanitation facilities, designed waste treatment programmes, provided clean drinking water and good health care, promoted family planning and provided concessional loans to women to help them set up micro-enterprises. This let local people not only benefit from the tourism service industry but also helped stimulate other industries.

The renovation of the village of Gandruk was the first attempt in this project. Through the development of modern energy, villagers have introduced some equipment, such as water heaters, solar panels and micro hydropower stations. In this way,

the amount of wood burning is reduced. Through the use of other energy sources, 170,000 tons of firewood is saved each year, accounting for 30% of the firewood (Nepal and Saarinen 2016). A basic principle of the project is to let the villagers actively participate in the construction of the project and encourage them to lend to the fund to start a business.

6.6 Conclusion

As one of the most environment-friendly countries in the world, Bhutan has a unique natural environment and cultural practices. However, the restrictive geographical environment has led to its economic development being very backwards, and there is a significant gap between Bhutan and the international level of modernization. Tourism in Bhutan has only accelerated in the last 10 years, but it is still in its infancy compared to other countries. Bhutan's natural ecological environment and religious culture are very attractive to tourists. The Bhutanese government also realizes that the development of the country's tourism industry has a wide impact on the promotion of the economy. This chapter examined the relationship between ecotourism and nature protection in Bhutan from the aspects of tourist experiences, government policies as well as local residents and discussed the balance between GDP and GNH. It is concluded that the development of ecotourism is one of the best ways to develop Bhutan. The characteristics of sustainable development of ecotourism can stimulate the country's economy, increase non-agricultural employment opportunities and expand farmers' sustainable livelihoods. It can also protect the natural environment to the greatest extent. Further research has found that the government plays the most important role in ecotourism, especially in limiting the number of tourists, establishing new energy-based infrastructure and issuing standardized tourism services, all of which require the Bhutanese government to lead. By warning about the negative issues encountered in Nepal's tourism development and the successful learning of the Annapurna Conservation Area Project, the researchers believe that Bhutan will benefit from ecotourism development projects.

6.7 Recommendations

The research team emphasized the importance of the government in the development of tourism in Bhutan because the tourism industry needs the cooperation of many departments. Only through government leadership can the appropriate policy be implemented. The recommendations in this research report are also based on government work.

6.7.1 Increase Investment

The government's leading role in tourism financing should be strengthened. If the government does not have a sufficient budget for infrastructure construction, it can appropriately introduce foreign investment, strict environmental monitoring and preferential investment policies. It can ensure that the tourism industry is not overexploited and that high-quality infrastructure is available.

6.7.2 Develop More Hiking Routes

The success of the Annapurna Conservation Area Project in Nepal's tourism industry shows that hiking is one of the most popular ecotourism initiatives. For Bhutan, the geographical characteristics are the most attractive to tourists so the development of more hiking routes will allow visitors to enjoy a more comprehensive view of Bhutan. However, in the development process, the challenges that need to be faced are the creation of rational designs of hiking routes, standardized trail levels, matching marking systems and service facilities and regulation of environmental pollution.

6.7.3 The Application of Science and Technology in Tourism

New energy technologies are increasingly being used in the development of tourism such as solar power and lithium battery vehicles. Undoubtedly, if Bhutan takes ecotourism as the core of its development, then in the construction of infrastructure, it is necessary to use low-carbon energy as much as possible to reduce environmental pollution.

6.7.4 Strengthen Publicity and Marketing

Marketing promotion does not mean attracting tourists without restrictions. According to the characteristics of the country, the Bhutanese government can focus on promoting ecotourism. In the tourism industry's infancy, it is possible to attract appropriate tourists. Before visitors enter Bhutan, they can clearly plan their journey. For example, by drawing on the marketing model of the European cultural journey, Bhutan can increase the overall concept of their own journey model and capture a target customer base. More importantly, vigorous publicity can also enhance the brand awareness of Bhutan's tourism industry, reduce the westernization trend of the younger generation of Bhutan, increase the sense of honour of the local people, and

lead to more enthusiasm about self-employment in the local tourism industry. The result would be an increase in the GNH value of the Bhutanese people.

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Chapter 7
Geophysical and Cultural Realities: Tourism Policy of Bhutan and Maldives

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Abstract Bhutan and Maldives have limited tourist arrivals primarily targeting quality tourists. This policy of targeting quality tourism is driven by geophysical and cultural realities undergirded by domestic frameworks. This chapter examines the literature related to constrained environments in tourist destinations that play a big role in determining the outcome of policy approaches and its implementation. Addressing the gap in tourism literature, the research locates the constraints in the two countries and how those limitations have steered the creation and implementation of policy approaches. Based on field observations and extensive library research, the two destinations are profiled as case studies combined with a synthesis of the literature.

Keywords Quality tourism · Cultural · Bhutan · Maldives · Limited tourism · Environmental constraints · Tourism policies

7.1 Introduction

Long before the crafting of the 2015 United Nations Development Goals 2030, both Bhutan and Maldives have been following the path of sustainable development that protects their cultural well-being and national resources. Since the 1970s, both countries have worked with international organizations like the United Nations and its

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subsidiary bodies, the World Bank, Asian Development Bank and other multilateral organizations to secure development sponsorships, and create employment for their people to alleviate poverty (United Nations Development Program 2007).

Due to competition and scarcity of resources, tourist destinations go to great lengths to develop resources and provide tourists with extra-ordinary experiences that are unique to their countries (Mazanec et al. 2007). Destinations continuously work to establish sustainable relationships with travelers by providing market offerings that deliver greater value than competing destinations (Qin et al. 2018). Two economic theories in this field are resource-based approach (Fu and Ban 2012; Kozak 2006). Wernerfelt (1984) posits that competitive advantages are derived based on how the firm utilizes its resources to the maximum efficiency. Porter (1980) on the other hand, approaches destination competitiveness from the perspective of the firm's ability to message its product to the market. The basic economic factors of production—Land, Labour, and Capital—are pertinent to any destination's putative growth (Holden 2009). If we extrapolate firm economies into the context of destination production and marketing, an understanding can be arrived that those countries endowed with resources may achieve comparative advantage but can only achieve competitive advantage if their resources are packaged and amplified in the global market (Ritchie and Crouch 2003; see also, Barney and Clark 2007).

These aforementioned resource and product-based theoretical precepts form the basic foundation of destinations and their original tourism policy as they emerged into the tourism network of global exchange. In this regard, this chapter attempts to identify and record the constraints of two destinations, Bhutan and Maldives in the contexts of (1) leveraging on natural endowments, (2) positioning their destinations within a market segment, and (3) managing sustainability while modernizing the economy.

The chapter is divided into three parts. The first part provides a comprehensive literature review addressing environmental constraints and sustainable adaptations in tourism. The method section expounds on the extensive secondary sources employed and a brief background to the research question 'Why Bhutan and Maldives have prefaced their tourism policy with Elite Travelers?' Then the paper moves to analyze three factors, namely, tourism activities, environmental constraints, and sustainable adaptations, to identify the basis for the tourism policies framework of the two countries. The chapter concludes by discussing the quintessential element that has made these destinations into single theme destinations and how resource-based policies is a key determinant of the destiny of countries engaged in global tourism.

7.2 Literature Review

One of the most rapidly advancing segments of tourism includes those activities that are dependent on natural environments. Literally, millions of tourists are attracted to areas that offer scenic beauty, unique natural settings, or opportunities for experiencing exotic cultures and locations. Within this context, Ewert and Shutlis (1997)

defined resource-based tourism as those pertaining to tourism activities and experiences dependent on the attributes associated with natural and relatively undeveloped settings. These activities generally involve small groups of tourists and often include learning opportunities related to the local culture or natural environment (Tolkach and King 2015; Rahayuningsih et al. 2016). A growing number of tourism and recreational activities is encompassed by this definition, including hiking, kayaking, homestays in traditional villages, natural photography/observation, snorkeling, camping, and rafting. Other terms that have been used in connection with resource-based tourism include community, nature and unique land features (Ruban 2018).

Scholars (e.g., MckErcher 1992; Williams et al. 1998) noted that the rise of resource-based tourism is often seen as competing land use for other resource-based industries. Lemelin et al. (2010) surmised that conflicts between resource-based tourism as well as other natural-resource-based industries can directly influence the development of a sustainable tourism industry. For instance, in the Province of Ontario in Canada, there is a long history of dispute between the forest industry and resource-based operators (cf. Hunt and Haider 2001; Hunt et al. 2009; McKercher 1992; Roehl and Fesenmaier 1987).

Bennet and Lemelin (2010) reviewed Ontario's resource-based policy within which the tourism operates. The study questioned both the impact and effectiveness of the resource-based tourism policy centered on five indicators such as: (a) the level of transparency, collaboration and representation in the policy's development; (b) the unity of the policy direction and actions; (c) the incorporation of science into proposed policy solutions; (d) the adaptability of the policy; and (e) the completeness of the policy's implementation to changing industry and contexts.

The development planning of cultural heritage attractions requires an understanding of the planning process and principles that govern sustainability which should ideally be based on the national policy of the country, or in its absence, then on the regional or area policy (Zyl 2005). Inskeep (1991, p. 278) warns of the problem which can surface in the early stages of development where traditional cultures can virtually disappear "with little sense of loss by the society because of the eagerness for economic progress."

Collins (1983, p. 58) places heritage and tourism in context of cultural traditions of a country. Heritage tourism is thus an established part of the interrelated growing business of conservation and culture. Heritage tourism takes an important portion of the product now being promoted by most government tourist boards, and all indications are that it is set to grow. Similarly, it has also become overwhelmingly clear that there is a need for it to be carefully monitored and controlled in order to be compatible with conservation and community needs (Zyl 2005). To ensure effectiveness, MacManamon and Hatton (2000, p. 7) mentioned that a national policy for the conservation of cultural resources must have three components:

(a) A strong national intent to protect and preserve cultural sites, structures and other resource types.
(b) Possess political support in its implementation; and

(c) Implemented cooperatively by government ministries and agents.

The temptation faced by a number of heritage site managers to perceive such an increase in terms of generation of profits can ultimately also prove to be disastrous (Zyl 2005).

One of the earliest scholars in the field of cultural heritage management, Boniface (1995) opined that if countries want to manage their cultural sites appropriately, their solutions will "have to be extremely radical and require a shift in mind-set" (pp. 111–112). Tourism activities affects the lives of people and the ecology, an axiom that is indisputable. Therefore, destinations considering their limited resources and when engaging in a tourism economy must design policies and plans based on a choice of the extent they wish to "mine" the resources for visitor experience (Holden 2009). Rettie et al. (2009), emphasize that in the conservation of resources such as nature parks and animal sanctuaries, a concerted effort is required to educate the public as part of the national tourism policy. The convergence of development strategies and tourism policies while it is an important signification, the element of sustainable ecology and the support to human cultural traditions has been addressed dispersedly (Telfer 2009).

Telfer (2009), uses the development studies approach to suggest that while at the macro level, tourism policy benefits the host country with exchange revenue and employment, the local communities at the micro level are impacted either negatively or positively. Tourism can contribute considerably to poverty alleviation in developing countries (Scheyvens and Russell 2012). While the divide between the two levels can be narrowed, the concerns with the limited resources and maximizing tourist arrivals may for some destinations lead to overtourism and create both social and physical structural stresses (Koens et al. 2018). The question that literature has not quite responded is how these economic goals, development strategies, and tourism policy interplay in the allocation of resources or how these competing challenges inform tourism policy trajectory of a destination?

7.3 Study Approach

Despite the fact that there is an overwhelming literature on understanding tourists' buying decision process, travel motivation and satisfaction, tourism literature seldom addresses the environmental constraints and how destinations actually make adjustments and at times sacrifice limited space and resources just to accommodate tourist and facilitate the global exchange and revenue that flows with it (Higgins-Desbiolles et al. 2019). Drawing on existing literature and reports, we establish the link between the environmental constraints in Bhutan and Maldives as reflective of their tourism policies. The chapter profiles the two countries in terms of their resources, offerings, locations and environmental constraints vis-à-vis their strategies to cope with the pressing tourism challenges (see also Gu et al. 2019).

Resource-based and policy framework approaches is the most suitable way to study two destinations that have limited the flow of tourism into their respective countries while at the same time ensure that those resources are sufficiently protected, preserved, and at the same time promoted (Gerber et al. 2009; Clement 2010). Indeed there is a genuine fear within emerging economies that when they engage in tourism, a heavier weightage should be placed on its cultural and natural resource use aligned with the larger national interests and a tourism policy framework that is reflective of the hosts values (Hasani et al. 2016; Mihalič et al. 2016). Unlike Maldives, Bhutan is located in the subtropical region just outside of the Tropic of Cancer. The inclusion of Bhutan in this study is aimed at showcasing as a tourism destination, it too faces similar limitations and targets a select group of tourists market. Much of the southern part are nevertheless tropical in nature. Finally, as a discipline entry, Bhutan's inclusion is premised on the fact that it exercises limited tourism policy similar to the Maldives.

Extensive documentary research and analysis are employed to posit that tourism policies are fundamentally guided by the geophysical and cultural landscapes of both countries. In order to embark on this thesis, the paper examines the resources available for tourism. Secondly, a review of the tourism policy over the past decade is presented to link policy to resources to record both destinations' adaptability to unique environments.

7.4 Bhutan

The Kingdom of Bhutan's tourism policy promotes "High Value, Low Impact" to create an exclusive image targeting high net-worth income travelers (Tourism Council of Bhutan 2020). In this section, four aspects of the counties constraints as perceived from within are highlighted that continues to hold true and shape the national tourism policy leading to a high yield tourism segment.

Located in the central Himalayan Mountains at a height of 8,000 feet above sea level, Bhutan has a unique natural environment. Unlike countries which have beautiful long beaches or green plains, this kingdom situates among steep mountains and deep valleys. Noticeably, its territory is all on land, sandwiched between China and India. Bhutan is famous for cultural tourism, besides trekking, nature-based and spiritual and wellness tourism. Although these special interest tourism exists, there are limits to its tourism industry.

While the country proudly emphasizes untouched landscape, it is not frozen in time. It has one of the most stable ecosystems in the world and has virtually no ecological damage due to its long isolation from the rest of the world until the mid-twentieth century, resulting in its largely intact environment. The restrictions on tourism and their protection of natural resources have let Bhutan preserve the beautiful scenery where one can experience the pristine eastern Himalayan view with snow-capped peaks that rise above primeval forests and hospitable traditional villages.

The Bhutanese customs and culture are deeply steeped in its Buddhist religion which travelers often find fascinating. The blending of the ancient and modern makes Bhutan endlessly intriguing. According to the Druk Journal (2019), in every corner of the kingdom, local people live in traditional buildings and wear traditional clothes. The country is culturally rich and has many special tourist destinations for sightseeing, trekking, and community-based tourism. These kinds of tourism involve heavily the local community and landscape. The local authority has done a good job in maintaining an appropriate number of tourist arrivals in the past, but because of the sudden increase in number of regional tourist arrivals, the locals are not ready to accept mass tourism. According to the exit survey in Bhutan Tourism Monitor (2018), banking services, communications and toilet facilities are the most significant problems faced by tourists. Besides, the more tourists go for sightseeing and trekking tourism, the more noise and litter pollution appears along the tracks, as well as in sacred monasteries. Hence, tourist experience is being affected (Gyeltshen 2019).

Finally, concerns about overtourism have become louder as a result of the influx of tourists from Bangladesh, Maldives, and India. A report from Tourism Monitor of Bhutan in 2016 shows that the number of tourists in Bhutan in was around 200,000, 250,000 and 274,000 in 2016, 2017 and 2018, respectively. Tourists from these three countries enjoyed visa exemption to Bhutan. This visa policy had significantly increased both tourism revenue and concerns of overcrowding. Concerns related to overtourism have been one of the growing worries among local authorities because of the increase in regional tourists a result of the visa exemption policy for citizens of Maldives, Bangladesh, and India. To rectify this policy, the Council of Bhutan Tourism established several new rules.

According to the Final Draft of Tourism Policy of the Kingdom of Bhutan (2019), which will be effective from July 2020, there will be no more visa exemption for citizens from India, Maldives and Bangladesh. In general, citizens from these three countries will now have to pay US$105 more to enter the kingdom (which includes a Sustainable Development Fee of US$65 and visa fee of US$40). The Tourism Council of Bhutan (2019; Indian Express 2020), effective from January 2020, also established new entry fees to monuments across Bhutan (see Table 7.1). The introduction of new entry fees is aimed to kill two birds with one stone: generating more income and reducing number of tourists to avoid overcrowding at popular attractions.

A recent world trend for host residents to open up their residential property to tourists has also taken Bhutan in a sweep. According to Seldon (2019a), along with the rapid growth of tourist arrival is the increase of budget hotels in recent years. Many local properties and serviced apartments can be found on Airbnb at only US$10 per room per night. According to Siok Sian Pek-Dorji (2018), there are more than 70 properties on Airbnb and nearly half of the tourists stayed in non-certified hotels and homestays. If these properties are in remote areas, they can not only generate income but prevent overcrowding. However, tourists visits to cities like Thimphu and Paro, are contributing to mass tourism. In view of protecting the traditional society and natural resources, the Bhutanese government is acutely aware that allowing a conflation of budget travelers into the country does not augur well for the tourism

Table 7.1 Revision for new entry fees effective from 1 January 2020 (Tourism Council of Bhutan 2019)

Monument	Adult (US$)		Children (US$)		Children 5 years and below
	Existing	Revised	Existing	Revised	
Tashichho Dzong	300	500	150	250	NA
Thimphu Memorial Chorten	300	500	150	250	NA
Taktsang	500	1000	250	500	NA
Rinpung Dzong	300	500	150	250	NA
Kichu Lhakhang	300	500	150	250	NA
Punakha Dzong	300	500	150	250	NA

policy of "Low volume and High yield." A stricter control is being advocated. Therefore, according to the Financial Express (2019), the Tourism Council of Bhutan is working on controlling budget hotels and non-certified properties to maintain the high value-low impact tourism policy.

Another outcome of sustainable adaptations to prevent mass and overtourism, Bhutan continues to maintain its standard of living and the country's resources well-kept. In offering a good product in terms of hygiene, during Bhutan's observance of World Toilet Day in 2018, the audience celebrated the achievements of several districts that successfully reached Open-Defecation-Free (ODF) status and realized 100% improved sanitation coverage according to JMP standards. JMP, or Joint Monitoring Programme by the WHO (World Health Organization) and UNICEF (United Nations International Children's Emergency Fund) provides regular global reports on drinking water and sanitation coverage (Xia 2018).

The sustainable practice is also enhanced by the tourism policy of limiting the number of flights into the country. The most crucial mode of transportation to enter and exit Bhutan is by air, carrying more than 98% of tourists enter and exit Bhutan in 2018 (Bhutan Tourism Monitor 2018), making the limited linkage between the country and the rest of the world. Despite the limit, Bhutan's national carrier, Druk Air has in recent years strategically expanded its network of airports by serving the Changi, Singapore—Guwahti, India—Paro, Bhutan air route since 2018 with two flights weekly (The Telegraph 2018). Beginning September 2020, Druk Air plans to fly an extension route Paro-Bangkok-Tokyo (News Bites-Private Companies 2019). These further attests that the country is targeting and making it easier for wealthier travelers to travel via this new route apart from the Bangkok-Culcatta-Paro and Delhi-Paro routes.

The Tourism Council of Bhutan also took steps in the period following closure of the country travel and inflight, a number of schemes to only support a little over 2400 people dependent directly on the tourism trade but also the period to improve tourist facilities such as stopover toilets at various tourist attractions, provide seed funding for accommodation upgrades or facelift for the opening of the country in

the post-Covid-19 period (South Asia Monitor 2020). About US$3.8 million of the US$19.8 million dollars originally budgeted for the tourism sector has been brought forward to bring some of the works improvement projects ahead of its schedule. The types of development and continued policy agenda of limited tourism including the example of imposing a hefty visa fee on Indian nationals means that the country is on the path of ensuring its resources are not over expended for the sake of tourism (Indian Express 2020).

7.5 Maldives

In 2019, the total number of tourist arrivals was at 1.9 million which is a steady increase from 1.4 million from the previous year (Samath 2020). In the period of 2014–2019 the Maldives tourism sector received US$692 million in investment and continues to be a destination not only for investment but continued dream destination for many in the luxury segment (Hok 2019). In this section we review the Maldives tourism policy emanating from the policy of "one island, one resort" which has thus far sustained the economy and the population's way of life. This section presents Maldives' sustainable adaptation measures in relation to the tourism constraints identified in the foregoing section.

This nation contains thousands of islands across the archipelago with a tiny population of around 436,000 people living in 188 islands (World Bank 2019a). In the period of 2014–2019 the Maldives tourism sector received US$692 million in investment and continues to be a destination not only for investment but as a dream destination for many in the luxury segment (Hok 2019). The industry focuses only on 5-star resorts and quality service at its resorts. The limited airport capacity is a challenge because it is not easy to expand the existing airport on limited land area.

Maldives has limited capacity to expand with a small labor force and a dispersed logistics for water and food supplies. Even though the World Bank (2019b) indicated the success of Maldives through the incredible figure of 100% literacy rate, it does not mean that the local labor force is sufficiently qualified or possess enough people to be gainfully employed in the hospitality sector. To be able to work in 5-star resorts, staff need to undergo a lot of training. Based on a report by International Organization for Migration (2018), not many Maldivians choose to study and work in the tourism industry. Given the fact that the nation has a small population and people living dispersedly in many islands, meeting the growing demand from a limited workforce is a challenge for Maldives. Based on a survey conducted by Salvini et al. (2016), 32% of the total tourism workers in Maldives are locals. As such, the government has been trying to solve the issue of excessive number of workers from Bangladesh who are mostly unskilled.

Maldives also addresses the constraint on limited labor force by proposing in the 5th Tourism Master Plan the new minimum wage from basic US$250 to US$600 per month (Junayd 2019). The introduction of a higher minimum wage will not only make tourism workers happier, but also uphold the service standards for elite

tourists in luxurious resorts. For a Small Island Developing State (SID) like Maldives, tourism is promoted in policy agendas on the grounds where it can enhance the lives of local people through the creation of employment and wages (Wilkinson 1999). However, Maldives has too small a population to support tourism that it leads to a reliance on expatriate labor. In the context of SIDs "tourism, offers the best chance for development in terms of creating growth and employment, generating foreign exchange and reducing poverty" (Croes 2006, p. 455). Indeed, equitable patterns of local employment are essential for sustainable poverty reduction and enhanced quality of life within local communities (Jamieson 2003). However, tourism's contribution to the national economies can be severely diminished with high leakages of foreign revenue as a result of high dependency on expatriate labor (Wall and Mathieson 2006). Therefore, a key question is whether the use of expatriate labor, coupled with the type and nature of employment created by tourism activity, is legitimately generating economic benefits for Maldives, and in turn, contributing to the sustainable development policy objectives of the country.

Another classic challenge all islands are facing is the sustainability of water and food supplies. In order to maintain a high level of service, good and stable sources of water and food are prerequisites. The distance between Maldives and the nearest land (Sri Lanka and India) is around 1,000 km, making the transportation and preservation of fresh food and water supply a challenge. World Health Organization (2015) mentioned that the water access in the country is high, but due to poor sewage systems, water degradation is a real risk. In 2019, under the collaboration between the United Nation Development Programme and Ministry of Environment and Energy in Maldives, the Adaptation Fund was established to improve facilities and physical systems in 3 Maldives islands (Derler 2019). To ensure the success, it requires efforts from the government, and engagement from the local people and other stakeholders. If successful, this will be the model for the whole nation to solve the water issue.

Transport and telecommunications among islands is not as convenient. Main local transportation between islands is by ferries. Even Male international airport is a standalone island itself. The local tourism industry depends heavily on ferries, which is time-consuming and costly. Lohrmann (2019) mentioned that the local ferry network only connects the main island Male to occupied islands, but not daily to resorts, which means that tourists may find it hard to explore on their own. Other means of transportation is by private air services, which is even more costly.

One interesting approach to tourist arrivals is that the Maldives though presents itself as a luxury destination, has a number of budget airlines bringing in visitors. This means that the country though has islands portending luxury assets such as 4–5-star hotel on the high end of service, there are also aspirational and budget travelers who may be traveling only for the weekend. Additionally, the fact that there are budget travel flights, the demand for budget accommodation is a definite phenomenon. Therefore, the question remains, how does the Maldives balance or promote itself to the international travel market?

7.6 Discussion

Tourists are enticed by Bhutan for its high mountains and monasteries with genuine tranquility. Meanwhile, Maldives attract tourist with its untouched coral reefs and deep blue sea. Each country has its own features and offerings which in turn help the locals to benefit from the tourism industry. The two tourist destinations are challenged by scarcity in resources and labor for the tourism industry. As they reach record high tourist arrivals, both Bhutan and Maldives face the problem of water scarcity and proper sewage system. Both countries acknowledge and share the notion that high tourist arrivals may result in harm to the environment and wildlife. As such, to develop a long-term tourism industry plan, these shortcomings must be addressed.

To sustain a manageable flow of tourists, Bhutan government plans to implement in July 2020, a new visa requirement and a raise in the entrance fee in tourist attractions will be applied to reduce the tourist arrival in the country. To address the constraint on the limited capacity to expand, the Maldivian government has been developing an alternative for budget travelers. Budget travelers can now find accomodation in guesthouses built on inhabited islands (Table 7.2).

The similarities in tourism constraints above show some common attributes in both Bhutan and Maldives. In Maldives, tourism is the top income contributor to GDP. The ambitious government is aiming for the number of 2.5 million by 2023. The more tourists coming, the more vulnerable the environment will be. This target implies that if there were no change in preserving the environment, it would be affected. Bhutan's GDP generated from tourism industry comes second place (after agriculture). The tourist arrivals had passed the record high of all time at 274,000 in 2018. Noticeably, if both countries want to pursue high value- low volume strategy. In case of Maldives: 72% of total bedroom capacity is in luxury resorts, while in case of Bhutan, all foreign tourists will have to pay visa fee regardless where they come from. The 2 destinations have similarities as limited kinds of transportations within the countries and natural landscape risk deterioration. Both are trying to live with their own tourism constraints to achieve higher tourism revenue. This is

Table 7.2 Tourism constraints—similarities

Tourism constraints	Bhutan	Maldives
Risk of landscape damage	Cultural life & natural landscape	Natural Landscape
Main transportation	Into the country: Air (98%) Within the country: Land	Into the country: Air (99%) Within the country: Sea
Influx of tourist arrivals	Cut off visa exemption, raise entrance fee, only accepting high-budget tourists	Develop guesthouses for low-budget tourists and luxury resorts for high-budget tourists
Tourism Education to develop skilled human resource	Highly lacking but desirable	Highly lacking but desirable

Source Synthesised Information

Table 7.3 Tourism constraints—differences

Tourism constraints	Bhutan	Maldives
Limited water & food supplies	Not an issue	Cooperation with UNDP on water issue
Needing infrastructure provisions	Open Defecation Fee status Applied JMP standards	Not an issue
Limited labor force	Not an issue	Increase minimum wage

Source Synthesised Information

because of the concern for both countries share that high tourist arrivals may lead to harmful environment and nature wildlife, which must be sustained in order to build a long-term tourism industry development, while the basic infrastructure is not yet ready.

The two destinations share differences in tourism constraints as shown in the Table 7.3. While limited water and food supplies is not an issue for Bhutan as the country can always import everything from China and India with cheap transportation costs, it is for Maldives because of its location standing alone in the ocean. Therefore, the country is cooperating with UNDP on fresh water projects to solve the problem and to meet the high standard of luxury resorts.

Likewise, while the under-developed infrastructure is not yet an issue in the Maldives because its tourists spend most of their time at luxury resorts on isolated islands, this is an issue for Bhutan because tourists want to trek and harmonize in pristine nature and cultural life. That is why Bhutan has applied the Defecation Fee status and recognized JMP standards to several districts to manage tourists' behaviors and somehow educate them. Lastly, Bhutan is not facing the issue of limited labor force because the actual number of elite travelers coming to the country has not surpassed the capacity of the industry. Seldon (2019b) mentioned the average occupancy rate in Bhutan in 2018 was 36% and most hotel employees are locals. Maldives, on the other hand, is relying on Bangladesh's work force as 32% of them are working in the Maldivian tourism industry and the government is planning to improve the quality service by raising minimum wage for them.

The Maldivian government has been developing an alternative for budget travelers in guesthouses. All of guesthouses are built on inhabited islands and many of them can be located on one island while all luxurious resorts are in separated uninhabited islands following the policy "one resort one island". This policy helps Maldives to continue appealing to many tourists without harming its natural coral reef and sea wildlife.

Bhutan continues with the "high value-low impact" tourism policy. Upon analyzing recent reports about tourist behaviors and local feedback, the government noticed that regional tourists are making negative impacts on its nature. They decided to apply a new visa policy with no more exemption for citizens of Bangladesh,

Maldives, and India. Reports from Bhutan Tourism Monitor (2018) also showed that a "regional tourist" who travels to Bhutan without any tour package (mostly from the 3 countries) spent an average of one-third of an ordinary international tourist. By applying new visa requirements and raising entry fee to their monuments, the government is expecting that the number of tourists will reduce, yet the ones that come to Bhutan will spend more, resulting in an increase in revenue in the end.

Also, at the time of this chapter writing, the COVID-19 pandemic have had its reach to both countries. Unlike many other countries, because of the limited tourism policies, Bhutan have seen a very low incidence rate of 102 infections as of 2 August 2020 while Maldives has 1398 people infected (GeoRank 2020). While Bhutan has followed much of the world in closing its border to international tourism during the periods of from February 2020 onwards, Maldives has taken the brave step of opening its isolated resorts for tourism with no quarantine requirements beginning July 15, 2020 when the pandemic health crisis still continues (Macan-markar 2020; Steinmetz 2020).

7.7 Conclusion

Bhutan and Maldives emerged from a unique regional setting with specific geophysical realities and cultural contexts. These conditions converged to create an apt tourism policy that protects local cultural practices and sustains the treasured touristic landscapes (Thirumaran 2009; Asian Development Bank 2015). Inskeep (1991) warns of the problem which can surface in the early stages of development where traditional cultures can virtually disappear "with little sense of loss by the society because of the eagerness for economic progress" (p. 278). Distinct to other conventional tourism where the marketing thereof is mainly in the hands of the private sector operators, heritage tourism products are an essential part of a nation's identity and the gatekeepers thereof should resist the temptation to follow competitive destinations that allow for multitude types of tourists. The economic benefits for a country or community are undoubtedly the prime motivator for 'exposing' its cultural heritage to tourists, and, for an impoverished community this is a great temptation. However, without careful management of this asset, it could vanish forever (Zyl 2005).

From the cases presented above, it can be concluded that tourism constraints can be an opportunity to develop new policies and practices. Tourism practitioners may look at these challenges as steppingstones so the destination can cope with the changes and continuously be part of tourists' choice. With tourist destinations evolving everywhere in the world, traveling has been and will be an instinct of the humankind. People will always travel. It is important therefore governments try to make their tourism sustainable and avoid overtourism as much as possible for long-term benefits. Because of the constrained conditions both by geophysical settings and a need to protect local way of life, Bhutan and Maldives have prefaced their policy toward elite travelers as much as feasible.

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Chapter 8
Analysis of Economic Activities in Urban Villages: Case Studies in Guangzhou, China

Hing-Wah Chau and Shiran Geng

Abstract Urban villages (UV), a unique Chinese urban phenomenon, were formed under the influence of China's 'open reform policy' and the subsequent urbanisation. The residential aspect of UVs has been well studied, but there is a lack of research addressing the economic activities and business nature of UVs and how businesses became self-sustainable with many constraints. The purpose of this chapter is to identify and study the current business operations in UVs, while discussing the potential adaptions, using UVs in Guangzhou as examples. This study uses four illustrative case studies, including Tangxia, Shipai, University Town and Xiaozhou UVs. By studying the four case studies, this chapter aims to formulate an idea of how businesses operate in UVs and provide recommendations on the further adaption of UVs and economic activities inside. Despite having a variety of constraints, UVs have numerous business typologies that are mostly inclusive, self-sustainable and self-developed. The case studies seem to benefit from being in such constrained environments. However, customers and business owners in UVs face many uncertainties, due to the potential demolition and the lack of regulations. Future studies are recommended to include the projected viability of UV businesses which are under threat of demolition policies, using more case studies from other Chinese cities. Potential adaptation strategies that can help UV businesses to operate better are suggested based on the results of the case studies. It is hoped that findings presented in this research are of significance to the enhancement of the UVs and its business operation.

Keywords Urban village · Guangzhou · Businesses operation · Urban phenomenon · Urban planning · Informal settlement

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8.1 Introduction

Under the influence of China's 'open reform policy' and the development strategy of the Pearl River Delta Economic Zone, Guangzhou has emerged to become a rapidly developing metropolitan city, which is located in the sub-tropical region of China. Since the end of the twentieth century, the economy in Guangzhou has exploded at an overwhelming speed and the escalating demand for business expansion and community-dwelling spaces has become a pressing challenge for the government and urban planners to tackle. Due to a variety of economic and political factors, constrained environments like *chengzhongcun* (also known as urban villages or UVs in this chapter) have been evolved out of former farmlands.

During the urbanisation process in Guangzhou, the government aimed to transform rural and agricultural lands into high-density property development areas. However, the acquisition of collectively owned rural lands was complicated and controversial, resulting in some rural lands left untouched by developers and local authorities. Under the extensive expansion of urban sprawl, there was a marked contrast to having these rural lands amidst the hustle and bustle of the city centres with high land value. The uncontrolled development of these rural lands resulted in the rise of extraordinarily dense mixed-use communities which mainly accommodate migrant workers with rural *hukou* (household registration in China). Landowners maximised profits by maximising density at the detriment of health and living conditions of the residents. Local climate and regulations were mostly neglected during the development process.

UVs have been widely regarded as migrant workers' first home in the city. Despite their hyper-density and stark difference from the surroundings, UVs are highly self-sustainable. Residents inside carry out various economic activities and operate different types of businesses, including convenience stores, restaurants, hostels, drug stores and many other sole trades, which also serve residents from surrounding communities. In Guangzhou UVs, the first and second floors of a typical seven-floor building are generally utilised as commercial and retail spaces. Small businesses in these zones provide affordable goods and services which cater for low-income residents living in UVs and areas nearby. Business practices in UVs are often unregulated. For instance, some business owners sublet part of their shopfronts to others for receiving more income. Some UVs have capitalised on financial opportunities by converting mixed-use functions into more commercial and retail areas. Salient example such as Tangxia, which is a large-scale community that includes both UV and social housing.

Various aspects of UVs have already been studied in the past, including resident demography, criminal behaviour, urban planning strategy and indoor environmental quality (Shannon et al. 2014). Although UVs has been well studied, there is a lack of research addressing the economic activities and business nature of these communities and how businesses become self-sustainable within various constraints. This chapter uses case studies to formulate an idea of how businesses operate in UVs in Guangzhou and provide recommendations on the further adaption of UVs and economic activities

Fig. 8.1 Locations of selected case studies in Guangzhou

inside. Selected case studies are Shipai, Tangxia, University Town, Xiaozhou and Nanting UVs (Figs. 8.1 and 8.2). History and key formation factors of UVs in the Pearl River Delta Economic Zone, where Guangzhou is located, will be outlined first. How business operates in UVs targeting both the residents and surrounding communities will also be discussed, using Shipai and Tangxia UVs as two primary case studies. In addition to the traditional business model in UVs, new UVs business phenomena as exemplified by the University Town (including Nanting UV) and Xiaozhou UVs will be discussed towards the end of this chapter.

As unique constrained communities in a sub-tropical metropolitan city, UVs offer ample business opportunities and affordable residential units for migrant workers and low-income minorities. Understanding the commercial features of Guangzhou UVs can help the development of appropriate strategies and policies to improve the conditions of other UVs in China. Future research areas could include the projected viability of these UV businesses, which are under threat of potential demolition policies from the central government.

8.2 UV History and Urban-Economic Circumstances

Traditionally, China was an agrarian village-based society with most of its population-based in rural and agricultural areas. Due to the limited opportunities and difficulties in communication and transportation, most residents were confined

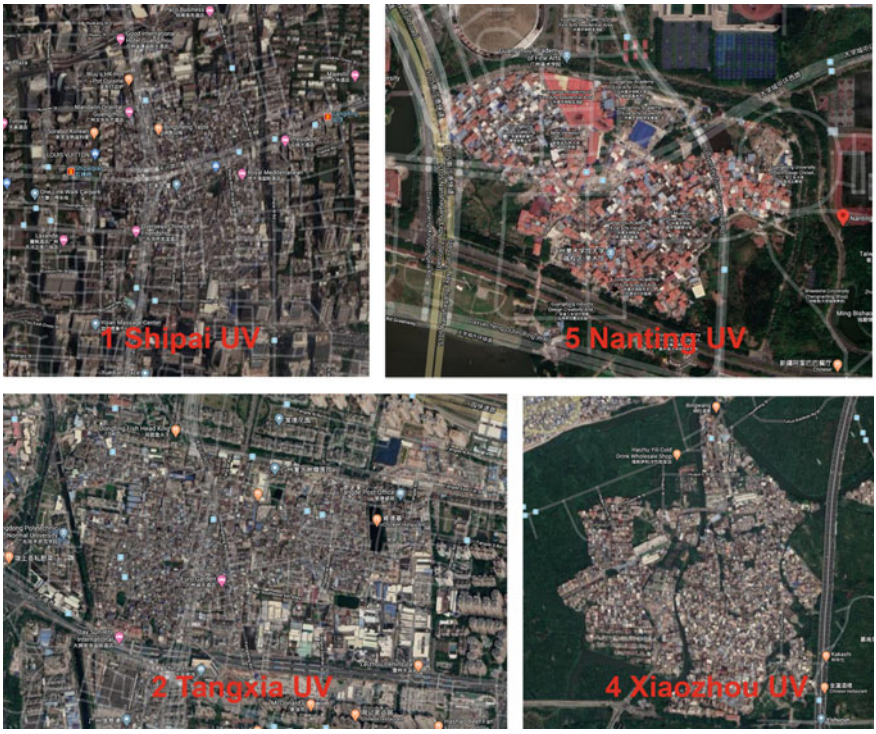

Fig. 8.2 Aerial photos of selected case studies and their surroundings

to rural areas where generations were actively involved in farming and harvesting. When the People's Republic of China was established in 1949, less than 11% of the Chinese population lived in cities (Campanella 2008). The Chinese government implemented the 'socialist economic reform' or the so-called 'open reform policy' in 1978 which allowed more urban-based entrepreneurs to start their own businesses and foreign companies to enter the Chinese market (Yeh and Li 1999). Under such unprecedented market opening, intense urban development began with an economic boom in cities. The Pearl River Delta Economic zone, one of the wealthiest regions in China at the present time, acted as a pilot region for 'social economic reform'. It became one of the largest urban agglomerations with one of the fastest-growing economies in the world. As the heart of the Pearl River Delta zone and one of the China's Nine National Cities, Guangzhou has around 14,904,400 population by 2018 (Guo et al. 2018).

There were two main phenomena that occurred because of the shift towards an urban-centred economy. First, China experienced a rapid urbanisation process that required vast rural lands to be converted quickly for urban development. Second was the emergence of 'floating population', a direct translation from the Chinese term, *liudong renkou*, which refers to people who remained working or living in cities

even though they were not registered with an urban household (Shi and Liu 2019). Farmers and agricultural labourers moved to the cities in search of job vacancies, higher salaries and better opportunities, resulting in a huge rural–urban migration in China (Edelmann 2008). According to the China Population Census, which is conducted every ten years nationwide, the percentage of rural residents has increased from 36.2% (in 2000) to 50.32% (in 2010), around 133 million people had left rural areas and moved to cities by the time of the most recent census (National Bureau of Statistics 2010). These two phenomena were the reasons for the existence of UVs, which were evolved to accommodate the influx of migrant workers from rural areas.

During the urbanisation process in Guangzhou, the government aimed to transform rural and agricultural lands into high density property development areas. However, the acquisition of collectively owned rural lands was complicated and controversial, resulting in some rural lands left untouched by developers and local authorities. Under the extensive expansion of urban sprawl, there was a marked contrast to having these rural lands amidst the hustle and bustle of the city centres with high land value.

According to the 'Chinese Land Regulatory Law (*tudi guanlifa*)', all lands belong to the nation, but traditionally, rural lands are often regarded as inheritable, and considered as being collectively owned by the landowners. This issue remains unclarified until today. Under this circumstance, UVs have been gradually developed without any official planning permission or building permit approval (Shannon et al. 2014). In contrast to surrounding residential blocks, gated communities and commercial towers, UVs are recognised as a unique type of settlement. The Chinese name of urban villages is *chengzhongcun,* which signifies the unique rural development background and the characteristic city locations of the UVs. Although UVs are often viewed as constrained and even undesirable urban slums, businesses over there are diverse, self-sustainable and attractive to residents and surrounding communities. Shi and Li argue that UVs act as supplementary business spaces, which are more affordable to low-income migrant workers compared with surrounding commercial development areas (Shi and Li 2015).

8.3 UV Formation Factors

Hukou system and social housing limitation are key factors to the formation of UVs. The current *hukou* system or household registration in China has been implemented under the 'People's Republic of China Hukou Registration Regulation' since 1958 (Windrow and Guha 2005). Newborns are required to register with the local government in order to become legal residents in China. There are two types of *hukou* in China: rural and urban. Rural *hukou* ensures people living in rural areas to have the right to own farmlands collectively and the right to social security locally. Urban *hukou*, on the other hand, ensures people living in cities to access to urban social welfare programmes and facilities. The registration system is an effective way to control the population distribution in China, but it also restricts the mobility of

people from rural to urban areas. Due to the limited resources in cities, rural *hukou* holders are not entitled to enjoy urban social welfare benefits.

Without urban household registration, migrant workers living in UVs are restrained in many ways. They often become members of the 'floating population', without stable jobs or secured accommodations. In some cities such as Guangzhou, people can still apply for social housing with non-local *hukou*. However, it is often impossible for rural migrant workers to stay in social housing communities due to the shortage of housing units. As a result, most of these rural workers choose to stay in UVs because of affordability and convenience, and perhaps, the fundamental reason for the absence of other available choices.

Another key factor that contributed to the formation of UVs is the lack of social housing development. Governments across the globe have been trying for centuries to solve housing issues for low-income minorities. With the staggering urban population and skyrocketing housing prices prevalent in China, the Chinese government is tackling this problem by learning the policies and experiences in other counties, especially Singapore, which accommodates 82% of its population in public housing (Wei et al. 2017). In Guangzhou, the capital of Guangdong province, a total of 166,800 public housing units were constructed across the city from 2011 to 2015 (Zhang et al. 2003). There are many emerging issues that have been identified, but not yet been resolved, such as the imbalance of job opportunities and housing supplies, the availability of affordable housing and the lack of communal facilities.

Under strict eligibility requirements and limited provision of social housing, most migrant workers choose to live in UVs. According to the government report 'Opinions on speeding up the "three old" transformation' published in 2010, there were 138 UVs in Guangzhou (Liang et al. 2018). The proximity to the city centre is a key reason for migrant workers to choose UVs over social housing as most of the social housing developments are far from the city centre and not as convenient as UVs.

8.4 Literature Review

Current studies on UVs cover current policy, stakeholders, the role of UVs, spatial quality, social inequality, renewal strategies and recommendations on future development. It is common to select UVs in Guangzhou and Shenzhen as case studies due to their crucial roles at the centre of Pearl River Delta Economic Zone under the most rapid transformation of development and urbanisation.

In terms of stakeholders, Jiang et al. (2020) used a well-established UV in Shenzhen as an example to identify the stakeholders with Hubei origin and the different interest of each stakeholder. Their research projects the complex dynamics of Hubei urban regeneration programme and the participatory planning process due to its stakeholder interests. This study suggested that the decision on compensation after UV demolition should be jointly negotiated by main stakeholders of local government, property developers, residents and migrant labourers and small businesses owners through a market mechanism. Taking consideration of all stakeholders during the

process of demolition is conducive to the implementation of urban transformation in UV. Zhao et al. (2019) looked at the stakeholders of the UVs from another perspective that focuses on their daily activities and behaviours. Using Xiaohe UV in Wuhan as a key case study, their research discovered how residents in UVs adopt different forms of spontaneous spatial practice as tactics. These include the ingenious appropriation of space, creation of consumption on their initiative and cultivation of social capital in response to the physical and social isolation of residents. Thus, they put forward the internal logic of spatial evolution, which should be respected from infiltrating outside space and coordinating inside space to motivate the power of everyday life in order to realise the continual existence of the UVs.

The role of UV as the site of cheap labour force has been studied by Zhan and Tong (2017), which is beneficial to China as the world's factory in the manufacturing industry. Similarly, research often highlighted the importance of UVs in providing migrant workers with low-price housing and being 'supplementary' to existing urban space in providing residential, commercial and cultural functions to its local and surrounding communities (Song et al. 2008; Song and Zenou 2012; Shi and Li 2015; Tong et al. 2020).

Besides, many studies have been conducted on the spatial quality of UVs, Fang et al. (2017) suggested that UVs often have a harsh physical environment with poor spatial qualities including high density, poor ventilation and lighting condition. Li et al. (2007) studied the overall planning of UVs through the case study of Chebei UV in Guangzhou and highlighted the significance of blurring the UV boundaries by infiltration to reduce the extreme difference within and outside UVs in the context of spatial quality and appearance.

Social inequality has also been identified as a vital issue in UVs. He et al. (2010) pointed out the stark differences of housing conditions between migrant workers and indigenous villagers. Low-income migrant workers pay rents to indigenous villages but stay in the poor housing conditions. This study also suggested that UVs share similar dynamics of housing differentiation as more extensive urban spaces. Much existing research identified the extreme social inequality that is occurring in UVs (Guo et al. 2018; Wong et al. 2018; Shi and Liu 2019).

Another critical area of interest is the evaluation of UV renewal or renovation, research by Lan and Lan (2010), Liao and Dai (2012) and Li et al. (2014) evaluated the success and failure of different UVs in Guangzhou post renewal or renovation (Lan and Lan 2010; Liao and Dai 2012; Li et al. 2014). Suggestions on how UVs could be improved with theoretical and conceptual frameworks have also been offered in many studies (Ma et al. 2014; Lin et al. 2015; Ye 2015).

From the literature review, we can identify and summarise the critical constraints of UVs. Firstly, one major constraint of UVs is the lack of proper urban planning with unregulated or illegal construction. This phenomenon led to spatial problems such as highly dense congested living environment, poor ventilation and daylighting conditions, narrow gaps between buildings, uneasy wayfinding, inadequate means of escape and fire firefighting access (Fang et al. 2017). Subsequently, both indoor and outdoor environmental quality of UV are poor comparing to other parts of the city. Secondly, due to the complexity of stakeholders and their different interests

in urban renewal and policy implementation, residents and business owners in UVs often remain uncertain about their next step. Residents and business owners in UVs usually are not updated on whether UVs will be demolished until last minute (Jiang et al. 2020). For example, for Zhujiang New Town in Guangzhou, the current plan states that the village renewal is a key priority, whereas the renewal programme remains tentative and exploratory (Zacharias et al. 2013). Thirdly, social inequality between the original villagers and migrant workers is also extreme in UVs. The combination of strong institutional constraints and emerging market influences lead to housing and income differentiation and inequality.

It is also evident that there is a lack of research in the commercial aspect of UVs. This study aims to identify and study the current economic activities and business operations in UVs, while analyse the potential adaptions, using four Guangzhou UVs as case studies.

8.5 Guangzhou's UV Development

Under the central governmental policy framework in China, Guangzhou as a major Chinese city has its own policies on land use. Similar to many other Chinese cities, there are three direct causes underlying Guangzhou's UV development: urbanisation, dual land system and the massive migrant worker flows, but there are also some unique factors affecting the historical development of UVs in Guangzhou as outlined in the following timeline (Shannon et al. 2014).

In 1956, the 'socialist reform' implemented by the central government categorised lands under two systems: urban lands became all state-owned, whereas rural lands were owned by collectives of rural citizens. During the urbanisation process of Guangzhou, many rural lands were expropriated by the state and transformed into various commercial and residential developments. Since rural residents collectively owned rural lands, so some expropriation processes by the state did not operate as smoothly as what was planned. Compensation negotiation with rural residents could, and often did, last for years. The local government struggled to find replacement residences in Guangzhou for those farmers who lost their source of income after expropriation. Additionally, the government was unable to pay the farmers with the market land price at the time. During the time when those lands were still controlled by the local farmers, they expanded their old houses and constructed new buildings on-site as they wished to meet the huge market needs. The extension and construction work proceeded without obtaining any planning permission or building approval. Along with the Pearl River Delta development strategy and subsequent economic boom, more and more migrant workers become the residents of these UVs, as it is difficult for them to apply for social housing or afford to live in other rental properties in the city (Chan 2013).

8.6 Businesses in Guangzhou UVs

Guangzhou and Shenzhen in the Pearl River Delta Economic Zone have the largest scale of UVs in China (Zacharias et al. 2013). UVs in these two cities have similar regional features, including common business types (Wang 2016). For example, Song and Li (2017) concluded that businesses in UVs often offer low-price products that attract local and surrounding residents, while being extremely flexible in terms of the types of goods and services they offer. Existing research concluded some key features of Guangzhou UVs businesses, including (1) low-rental prices of shop fronts in convenient city-centred locations; (2) a large variety of business types and affordable products; (3) being supplementary to surrounding urban businesses that are often less affordable; (4) spontaneous bottom-up businesses that address local residents' needs; (5) lack of regulatory measures for business practices (Su 2007; Ma et al. 2014; Shi and Li 2015; Wang 2016; Song and Li 2017). This chapter will explain UV businesses starting with two well-established UVs, Shipai and Tangxia UVs. Established UVs are generally located in the centre of the city with no vacant land left as all available lands within UVs are highly developed and are mostly occupied by migrant workers in China (Liao and Dai 2012; Zang et al. 2017).

8.6.1 Businesses in Shipai UV

Shipai UV, located in Tianhe district, is one of the largest UVs located centrally in Guangzhou. Its land size is 0.6 square kilometres, with 3,656 buildings that have a total of one million square metres floor area (Zacharias et al. 2013). By 2009, Shipai UV accommodated around 10,000 permanent residents and 80,000 migrants. 45% of the residents are working in IT industry around Shipai UV and 35% are working in hospitality both within and outside of Shipai VU (Wang 2016). Apart from the UV, the remaining lands of the Shipai village are no longer owned under collective ownership and are developed into residential or commercial developments, including gated residential communities, shopping malls, offices, community buildings, four leading universities and several IT markets (Shannon et al. 2014).

The urbanisation process in Shipai can be traced back to 1925 when the Kuomintang-ruled government transformed part of the farmlands of the Shipai village into Sun Yat-sen University, a racecourse and a military airport. The most rapid urbanisation period only started in 1985, when the new district, Tianhe was declared as an additional city quarter to create a new urban project for the 6th National Games in 1986. In 1991, along with the economic boom in the Pearl River Delta Economic Zone, development in Shipai started to happen. Tianhe district became the centre of new urban Guangzhou, and the farmland area of the Shipai village decreased rapidly. By 1997, most of the farmlands in Shipai had vanished. From the development history of the city, it is not hard to understand why Shipai UV was left with only one patch of land in Tianhe. The former Shipai village was divided into sections at

different time periods for various development purposes. Today, it has become one of the most successful UVs in the region due to its central location, which is close to the IT sector of Tianhe District (Wang 2016).

Businesses in Shipai UV are mostly run by the residents living there, including migrants and original villagers. Hence, those businesses are often described to have spontaneous nature (Shi and Li 2015; Qi and He 2017; Zhao et al. 2019). Shipai UV businesses were started to serve local residents and most of the businesses are run by small sole traders. Since the rents are relatively low and the primary customer target is the group of local residents, these businesses often offer goods and services at affordable prices. These small businesses survive and enjoy benefits from being in such a unique environment.

Businesses in Shipai UV are often small in scale in hospitality and retail industry. Hospitality businesses include restaurants, recreation spas and salons, motels and mahjong stores. Retail businesses include convenience stores, drug stores and speciality stores such as hardware supplies. Shi and Li (2015) describe UV businesses as supplementary to their surrounding areas. Various types of businesses providing goods and services at low prices are attractive to students, migrant workers, retired people and other low-income groups. It is common for those people who work or live in surrounding areas to come to Shipai UV for affordable goods and services that are not available elsewhere in Guangzhou CBD (Shi and Li 2015; Qi and He 2017; Zhao et al. 2019).

Most of the UV businesses are located on the first two floors, and sometimes the economic activities are extended onto the street, which causes the already narrow streets and footpaths even more congested (Fig. 8.3). The lack of regulatory measures, on one hand, allow freedom and flexibility for small UV businesses to operate; on the other hand, does not provide enough guarantee or protection for customers, especially for those goods and services provided by the unregulated sublet shops. In Shipai UV, most business owners live on top of their shops or at the back of their shopfronts

Fig. 8.3 Ground floor shopfronts and a narrow street with businesses in Shipai UV

(Fig. 8.3). Such a mix of commercial and residential spaces is called '*qiandian houju*' *or* '*xiadian shangju*', which literally means 'front business with living at the back or business below with living above'. This building typology enables businesses to operate all year round with open shopfronts on the street level. This typology is suitable to the climatic conditions in Guangzhou and can be found in many tropical or sub-tropical cities, such as Kuala Lumpur and Singapore.

8.6.2 Businesses in Tangxia UV

Tangxia UV shares a similar development history with Shipai UV. It is located not as close to the city centre as Shipai but is close to the most prominent social housing community in Guangzhou—the Tangyue Community (Tang 2018). By 2015, Tangxia UV accommodated 2,640 original villagers and 20,000 migrants. Similar to other UVs, Tangxia UV has often been described as 'dirty, disorderly and bad' (Tang 2018). Tangxia UV is being physically disadvantaged by the unregulated built environment and other spatial problems such as the lack of proper road planning (Fig. 8.4). However, with the extensive residential development within Tangxia UV and Tangyue social housing, Tangxia UV developed a few vegetable and food markets that now offer products to all these residents. Food markets in China can be state-owned or privately owned. Shopfronts inside the market are rented out by the market owner (state or private) to sole traders. Residents living in the UV or from the low-income community nearby operate most of the small businesses inside the Tangxia market (Fig. 8.4). Common small sole trades can be seen in Tangxia UV similar to Shipai UV. It is common for residents living in Tangyue social housing to visit the Tangxia market for shopping and other services.

Tangxia UV near the low-income community of the Tangyue social housing is different from Shipai UV, where most of the surrounding areas are residential and commercial developments with high rental prices. Perhaps due to the large number of low-income people living around Tangxia UV, the scale and variety of businesses

Fig. 8.4 Exterior and interior of Tangxia Market

in Tangxia UV are bigger and more extensive than those in Shipai UV. For example, the vegetable market in Tangxia UV is one of the largest food markets in Tangxia suburb. Although the physical environment in the market is still quite modest, such a wide variety of products is hard to find elsewhere in this suburb.

8.6.3 Businesses in University Town UVs

In recent years, higher education has been expanding in China, especially in the Pearl River Delta Economic Zone. The formation of university towns with a high density of students and the expansion of the university campus have led to studentification of these areas. Studentification can stimulate considerable changes of neighbourhoods and the structure of housing provision. The studentification phenomenon has evolved into different locales and impacted the urban socio-spatial structure of Guangzhou. The development of Guangzhou University Town, located in Xiaoguwei Island, Panyu District, has brought demographic and economic changes to UVs nearby. The Guangzhou Higher Education Mega Centre (GHEMC) was opened in 2004, with an area of 17.9 square kilometres and 3.53 million square metres (He 2015). Twelve universities are located within the GHEMC, while the total number of students is around 180,000–200,000. The entire complex can accommodate 350,000 to 400,000 people, including students (Liu et al. 2015). Four villages remained after the development of GHEMC, including Beiting, Nanting, Huishi and Beigang, which have now become UVs.

The four UVs (Beiting, Nanting, Huishi and Beigang) within GHEMC are now mostly occupied by students from surrounding universities. Businesses inside these UVs mainly serve student residents, university staff and original villagers. Compared with Shipai and Tangxia, the business development of these four UVs had more involvement from the local government. Some large-scale shopping centres were planned by the government. Liu et al. (2015) observed that the substantial commercial developments of these four UVs, including the Guangzhou University Town Commercial Centre, Beiting Complex and Beigang GOGO Shopping Centre, mainly target staff members and students from the surrounding universities with higher spending power. Apart from large commercial developments, small sole trades are still the most common business type in these four UVs (Fang and Qin 2018). The smaller businesses target original villagers and low-income students instead. However, during the summer and winter breaks when staffs and students are mostly away, those large shopping complexes go through a period that there are not many customers. The small shops in these UVs, including restaurants, convenience stores, speciality businesses, that target both local villagers and students receive less impact from university vacations.

8.6.4 Art-oriented Businesses in UVs

UVs that offer affordable rents in close proximity to urban life, tranquil natural amenities and more freedom from state intervention become an ideal place for art studios and exhibitions (Liu et al. 2013). In China, art and cultural clusters are either self-developed or government planned. Some of the self-developed art clusters may become intensively intervened by the local government once their scale and influence become highly visible. Many researchers criticise the adverse impact of the intensive government intervention in the development of the self-formed cultural clusters as such intervention can turn the original creative place into a market-driven tourist spot that prioritises consumption over artistic production (Pratt 2004; Webster et al. 2011; Li and Liu 2019). For example, Xiaozhou UV, 1.4 km away from the GHEMC, is a well-known art-oriented UV, which lies on a designated green zone, a watery landscape of former orchards and villages. Xiaozhou UV is around 6.5 km from the edge of Zhujiang New Town, a new financial centre of Guangzhou (Zacharias and Lei 2016). Due to its natural scenery with water features, the villages attracted many artists since 1995. Compared to formally planned art districts, UVs perform better by providing artists and designers affordable and tolerant environments as incubators for them to develop their creative careers (Liu et al. 2013; Zacharias and Lei 2016; Li and Liu 2019). Hence, Xiaozhou UV attracted many artists and art-related businesses. The success of UV-based creative clusters lies not only in their proximity to the urban market and art colleges but also in their reciprocal economic and social mechanisms through which benefits can be enjoyed among all members of the community, including resource-constrained young artists and designers. UVs offer a wide range of social and economic opportunities for residents (villagers and artists) and local entrepreneurs. Guangzhou government is becoming aware of the importance of cultural clusters, and most artistic UVs are sustaining until today. This phenomenon also highlights the inclusiveness, diversity and adaptability in terms of property management mode, built form and planning governance. Many criticisms have been received in terms of unregulated urban planning and construction practices. However, it is undeniable that these constraints occurred in Guangzhou UVs foster the development of bottom-up art districts that allows artists to create with freedom. The lack of control provides premises for consumer services, art training centres and student accommodations. Art-related businesses include art supply shops, cafés, bars, studio workshops, art galleries and exhibition spaces common in art-oriented UVs. The lack of regulatory mechanisms provided opportunities for these small businesses in the art cluster village that continue to serve such a large number of customers.

Apart from Xiaozhou UV, one of the four remaining UVs of GHEMC, Nanting UV is successful and unique with a distinctive art cluster. It sits next to Guangzhou Academy of Arts (referred as GAFA), Art students from the nearby GAFA prefer to rent their accommodations in Nanting UV, which can fit their expressive and individualistic lifestyle. By March 2013, there were 854 buildings with 8,417 rooms that accommodate 3,158 people. Among them, there were around 400 university students, with seasonal fluctuation (He 2015). The art and design students staying in

Fig. 8.5 Art supply shopfronts and unregulated planning of shops in Nanting UV (Reproduced from Yi 2011)

Nanting UV often engage in art training institutes for existing and future students. By 2015, there are 50 art training institutes of various sizes in Nanting UV. Apart from private art training institutes, art-related businesses such as art supply stores, instrument stores, live music bars are also common in Nanting UV. Most of the commercial development did not go through regulated urban planning process (Fig. 8.5). Students, original villagers and small entrepreneurs from outside the UV enjoyed business opportunities in the absence of state institutions in UVs. He (2015) also suggests that apart from the shopping centres that were planned by the authorities, there is no formal provision of commercial and retail services within the four UVs in GHEMC, including Nanting, Beiting, Suishi and Beigang.

8.7 Discussion and Recommendations

It is controversial regarding the continual existence of UVs. On one hand, UVs are considered to be demolished due to its incompatibility with its surrounding urban context and existing planning regulations; however, there are many merits of having UVs that deserve the tolerance for their continual existence (Hao et al. 2011). UVs provide affordable housing accommodation and vibrant commercial areas for migrant workers and residents who receive limited or even no financial assistance from the government (Zhang et al. 2003; Wang et al. 2009; Chung 2010; He et al. 2010; Song and Zenou 2012; Wu and Logan 2016; Guo et al. 2018). Since UVs accommodate large number of residents and the shops there serve communities nearby, so the economic activities and businesses there are often prosperous. The existence of businesses in UVs is essential to maintain the sustainability of urban markets in Guangzhou as it provides job positions, business opportunities and creative venues to the low-income minority, students and even artistic professionals.

In 2014, the Chinese government unveiled a new ‘people-centred’ plan for urbanisation to speed up the demolition process of UVs (Xie 2014). These demolition

and urbanisation processes cast uncertainty on UV residents and business owners about their future accommodations and business operations. If the existing UVs are demolished, the impact on the current economic activities and business operations over there is detrimental. Besides, many low-income minorities may face homelessness situation, as only a small percentage of these residents are young skilled workers who have stable jobs in the city and are eligible to apply for social housing. Alternatively, they may relocate themselves to second and third-tier cities for job opportunities and affordable housing.

Referring to the case studies, UVs play an important role in offering a variety of affordable goods and services to local residents and surrounding communities. The existing UV social environment is highly functional and self-sustaining. Most of the current business typologies are spontaneously developed to cater for the needs of the residents of UVs, The existing environmental quality of UVs can be improved through careful alternations to enhance the natural ventilation, daylighting, means of escape and firefighting access. As a result, the physical environment for economic activities and business operations can also be improved. Regarding the future of existing UVs, instead of adopting the conventional top-down development approach, decisions can be made collectively among the original villagers, residents and current business operators. All stakeholders' voices should be heard and duly considered to minimise social inequality.

8.8 Conclusion

In conclusion, benefiting from the low-rental price, proximity to the city centres and relatively loose regulatory mechanisms, UVs in Guangzhou become essential markets to everyday urban life for both residents and surrounding citizens. Being mostly self-formed by UV residents under a bottom-up development approach, businesses in UV reflect residents' actual needs. Businesses in Shipai UV fulfil the needs of migrants who often work in the centre of Guangzhou with a busy lifestyle. Small everyday convenience shop is the most common type in Shipai UV. Tangxia UV, next to a large low-income housing community, has more variety of businesses in larger scales, such as a large vegetable and food market. With a large number of students from twelve universities nearby, the UVs next to the GHEMC have some large shopping centres planned by the government, as well as some small sole trades and hospitality stores that target the younger generations. Nanting UV, one of the GHEMC UVs is an art-oriented UV due to its artists and art student customers. Similarly, Xiaozhou UV, with great scenery, has also attracted art professionals throughout the years and gradually become an art-oriented UV with relevant businesses.

Despite having a variety of business typologies due to different residents' needs, UVs face various constraints, such as the lack of proper urban planning, complex stakeholders and social inequality. As seen from the selected case studies, businesses and customers in these Guangzhou UVs benefit from being in such a constrained place. Business practices in UVs are often unregulated. Until today,

Shipai, Tangxia, the four University Town (GHEMC) UVs and Xiaozhou art-oriented UV are still operating as usual and providing daily goods and services to residents, surrounding communities, students and local artists. However, the future of businesses in Guangzhou UVs remains uncertain. The continual existence of these UVs together with the associated economic activities and businesses operations are recommended, but careful alternations can be implemented to enhance the existing environmental quality over there. Stakeholders' voices should be taken into consideration for any development proposals of the existing UVs to minimise social inequality.

Glossary

chengzhongcun	城中村	urban village (referred as UV in this chapter)
hukou	户口	household registration
liudong renko	流动人口	floating population
Nanting UV	南亭城中村	
qiandian houju	前店后居	front business with living at the back
Shipai UV	石牌城中村	
Tangxia UV	棠下城中村	
tudi guanlifa	土地管理法	Chinese Land Regulatory Law
Xiaozhou UV	小洲城中村	

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Chapter 9
A Political Economy Perspective: Attracting Foreign Direct Investments into Sri Lanka and Vietnam

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Abstract Over the last three decades, developing countries in Asia have directed their economies to focus on increasing their foreign direct investment opportunities as a means of invigorating development and employment opportunities for their citizens. During this time, Sri Lanka has emerged from a destructive civil war while communist Vietnam has embraced market reforms. This paper attempts to record and analyze the foreign direct investment flow outlining the different strategies adopted under various political regimes. The significant contribution of this chapter lies in the identification of adaptive strategies for the two countries that seek to implement new domestic frameworks and international relations.

Keywords FDI · Investment flows · Tax · Incentives · Political stability · Skilled labor · Institutional framework

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9.1 Introduction

Foreign Direct Investment (FDI) is a key development tool for many emerging economies. In the 1970s and 1980s, countries such as Singapore, Thailand, Indonesia, Taiwan and South Korea have benefited from this strategic economic policy. By welcoming foreign firms millions of dollars have been invested by foreign entities in a bid to establish new production, research and business facilities. In doing so, these organizations have reaped the benefits of low-cost labour and a highly skilled, productive and disciplined population base. This narrative partly explains the success of the economies of the region. In 2019, the FDI flow from around the world amounted to US$1.4 trillion and of this, developing Asia received over US$500 billion worth (Statista 2020).

In this regard, FDI flows into developing countries have normally occurred as part of merger and acquisition deals from multi-national enterprises (Globerman and Shapiro 2005; Kang and Johansson 2000; Stiebale and Reize 2011) or through stocks and bonds (Hasan 2004; Aduda et al. 2012). Since 2008, greenfield investments, in which a MNC forms a subsidiary in the host country as a new venture, have increased in size, growing from US$275 billion to US$325 billion in total market capitalization in the Asia Pacific region (United Nations 2020; see also Davies and Desbordes 2015). Evidence suggests that the region has opened itself up to FDI flows with key incentives such as tax breaks, subsidies and facilitating local supply chains. While FDI plays an important role in emerging economies that lack the capital wherewithal, the question remains as to why some countries continue to struggle attracting or be competitive in securing such investments.

FDI is an essential component to an economy that seeks to expand its production possibility frontier through technological improvements, capital investments and new production capacities and product development. However, weak states struggle to meet the demands of foreign investors for opportunities that can be exploited (Häberli and Smith 2014; Malikane and Chitambara 2018). Countries with internal strife often deter FDI where the initial requirement is a stable and conducive environment for business operations. In this chapter, we explore the Sri Lankan and Vietnamese economies by evaluating the FDI policy measures implemented in the aftermath of significant economic and political change. There are measured indications that with FDI, political stability and economic growth goes in tandem (Kuhre 2016; Nor and Masron 2018). This chapter attempts to unravel the extent to which FDI flows into Sri Lanka and Vietnam impacted their respective economies in the postconflict era.

This chapter adopts a political economy disciplinary approach to examine the politics and economics of two countries which are dependent on FDI to fast track their quest for national development. After reviewing the literature to locate the study of post conflict and new turn in economic policies, the country profile section identifies challenges and mitigation efforts to attract FDI. The conclusion explores future research trajectories in the areas of FDI and post conflict areas in the broader global context.

9.2 Literature Review

Ezeoha and Ugwu (2015) posit that rebuilding infrastructure damaged by conflict can attract FDI. Other in-country alignments such as institutional frameworks and market factors are relevant to the destination's capacity to attract FDI (Chen et al. 2017). These alignments are essential in convincing foreign businesses to establish subsidiaries or other operations since changes in economic policy or instability in institutional policy frameworks, especially for a country emerging from a postconflict era, can have large impacts on both the structure and the size of FDIs (Da Rin et al. 2019).

When considering whether a market or a country is good for investing, several factors are considered desirable, including a healthy government fiscal balance, an appreciating real exchange rate (Goldberg and Kolstad 1994; Mercereau 2005; Kiyota and Urata 2004), low inflation (Singhania and Gupta 2011; Demirhan and Masca 2008), low interest rates (Siddiqui and Aumeboonsuke 2014) and a strong financial system and institutional bodies (Mercereau 2005). However, Hausmann et al. (2000) argued that an indication of large FDI inflows does not mean that a country has a strong and stable financial system and domestic institutions.

Al Nasser (2010) showed that FDI is an essential tool in developing economies. Governments favour FDI as a means of developing their economy and foster growth rates (Narula 2012). Demirhan and Masca (2008) noted FDI is favoured by developing countries, as it helps to alleviate the problem of a national savings shortage, and thus overcome an inability to finance investments with local sources of capital. He also said that those economies always need foreign capital, at first by taking international loans, but later changing to favour direct investment as well as indirect investments, such as mutual funds and directed partnerships, etc.

There are many positive benefits for countries receiving FDI. This type of investment allows for technology relocation (Potterie and Lichtenberg 2001; Loungani 2001), normally under the form of transfers from developed to developing economies. Balasubramanyam et al. (1999) and Dang (2013) pointed out that another benefit for recipient countries is the promotion of competition in local markets. When a new advanced technology arises, other local companies will face the threat of losing market share, which forces them to become more competitive. Blomstrom (1991) and Balasubramanyam et al. (1999) also identified labour force benefits in host countries, as FDI encourages businesses to offer training programmes for local employees that correspond with the introduction of more advanced technologies. As discussed by Nguyen et al. (2019a), Buettner et al. (2018), and Barry (2005), there has been much debate about the level of corporate tax revenues as a result of FDI projects in host countries since the emergence of transfer pricing, although FDI was originally meant to contribute to host countries in terms of corporate taxes paid (Balasubramanyam et al. 1999).

Post Conflict justice is also an important factor where it could increase the positive image of the host country (Appel and Loyle 2012). The risk of violence, unrest, war and conflict in the host country consistently provides a negative picture to investors

(Barry 2018). Also, some of the other indicators are law and order, the stability of the government, and bureaucracy related to investment (Busse and Hefeker 2007). Political risk indicators have negative influences on FDI inflows to any country especially emerging economies (Khan and Akbar 2013). Political instability creates an uncertain economic environment, one of the main factors impeding FDI inflows, thus requiring countries to take extra measures to attract FDI. Various studies in the past have shown negative correlation between increased political risks and FDI inflows. (Click 2005; Hayakawa et al. 2011). Such political risk factors include democratic accountability, government stability, socio-economic conditions, religious dissension, internal and external conflicts, investment profile and ethnic tension. Sustained periods of peace create favourable conditions for new investment (Barry 2018).

When economic factors are considered, strong stability of the exchange rate was preferred as the key reason. Azam and Lukman (2010) found that a good set of FDI determinants include market size, external debt, domestic investment, trade openness and physical infrastructure in India, Indonesia and Pakistan. Bokpin (2017) elaborated further by pointing out that the more FDI that flows into a country, the less sustainable it would be if there is weak governance and vice versa. In any event, obtaining a healthy and sustainable level of FDI is among the top priorities for many countries. Garriga and Phillips (2014) studied the significance of foreign aid in a set of post conflict countries. In recent times, the barometer has shifted with investors beginning to depend less on foreign aid as a signal for investment opportunities with the ease of access to increasing amount of data driven investment decisions.

9.3 Study Approach

Attracting FDI involves three common precepts: (1) domestic stability and accessibility of various productive resources (2) the international relations environment concerning various stake holders and (3) the firm's business decision based on factor costs and market proximity (Dascher 2015; Bédécarrats et al. 2019).

Country profiles are added in this chapter to provide a basis for contextual analysis. Similar approaches have been adopted in the context of FDI in post conflict destinations such as Nigeria, Nepal, Sierra Leone, Georgia, Kosovo, Angola and Myanmar (Goldberg 2008; Afram et al. 2012; Nyeadi and Adjasi 2020; Skovoroda et al. 2019). Sri Lanka and Vietnam were selected because they stand as unique cases in the tropics. Both countries are pursuing international market integration and are open to FDI. It is also important to notice that both share border with two of the Asian superpowers; Sri Lanka shares the territorial waters with India, while Vietnam shares land and sea borders with China. The countries were chosen not for the purposes of comparative study but to understand how both a democracy and a socialist government approach the goal of attracting FDI despite diverging political systems. Three primary research questions emerge:

R1: What are the political and economic conditions in both countries which impede FDI inflows?
R2: How does perception of doing business affect international interests?
R3: What efforts were made by the respective national governments to attract FDI?

In an empirical study of small economies that were politically stable and prone to violence, Kurecic and Kokotovic (2017) found a greater volume of FDI outflows in long-term relationships with economies that are politically unstable. In adopting a more political perspective, Pinto (2013) finds that FDI favours left-wing governments where the trade liberalism policies are more attuned to less unrestricted commercial transactions than is a right wing regime where regulatory measures tend to be a challenge to larger business interests. In this profile section, we examine the states of Sri Lanka and Vietnam. We attempt to coalesce the different political and economic factors that determine the FDI flow into these countries and examine national frameworks that filter or enhance them to make way for FDI.

9.4 Sri Lanka

Sri Lanka is a tropical island country situated just below the Indian subcontinent on an important strategic maritime trade route. In this post-independence period, Sri Lanka with a population of almost 22 million has all of the right attributes to become an international business hub: abundant natural resources, an advantageous geographical location, and a highly skilled low-cost labour force. Successive post-independent governments have implemented different economic policy agendas, all of which have failed to capitalize on these opportunities, creating political turmoil and disastrous ethnic conflicts (Snodgrass 1999). Due to these conflicts, the overall political climate, as well as the policies and macroeconomic conditions of the country, Sri Lanka has been poorly placed to attract investments. In the last five years, the country received USD5.3 billion in FDIs but the net inflow after excluding repatriation of profits, interest payments and debts remitted, the figure is estimated to be less than a billion dollar (Hettiarachchi 2020). Few studies have sought to develop an understanding of Sri Lanka's deeper challenges. In this chapter, we analyze the political challenges that have impeded the economic progress needed for the country to emerge from the post-civil war era with a positive growth trajectory and how FDI is affected by those challenges.

The country's ethnic civil war began in 1983 (Grobar and Gnanaselvam 1993) and ended in 2009. In the aftermath of this civil war, numerous studies have highlighted the degree to which Sri Lanka has missed FDI opportunities (Ravinthirakumaran et al. 2015; Konara and Wei 2017). At the same time, the world was facing a global financial crisis, and oil prices had reached historically high levels, leading to price increases in commodities, transportation and raw materials (Demyanyk and Hemert 2011). Moreover, Sri Lanka faced additional economic pressures, due to urgent reconstruction requirements, humanitarian efforts and increased government support for the

poor. As a result of the conflict, a series of significant economic problems emerged. These issues could be addressed through FDI growth which was needed to overcome the gaps in savings and investments as well as foreign exchange.

As a result of the conflict, a series of significant economic problems emerged. These issues could be addressed through FDI growth which was needed to overcome the gaps in savings and investments as well as foreign currency exchange. In early 2010, the incumbent president Mahinda Rajapaksha was re-elected for a second term. His election manifesto '*Mahinda Chinthanya: vision for the future*' offered potential to rebuild the nation's infrastructure. The strategic geographic location of the country was an important factor for commercial, aviation and naval activities but it was never exploited to achieve any comparative advantage. Sri Lanka was already producing/supplying knowledge and skills at a level that was competitive by world standards (Abeyratne 2010b). These factors attracted investments in diversified areas from many Indian companies following the signing of the Indo-Sri Lanka Free Trade Agreement. Sri Lanka's other significant contributor was China, especially in infrastructure projects as part of China's Belt and Road Initiative.

The tourism industry was expected to make an ambitious leap forward from 0.5 million arrivals in 2009 to 2.5 million by 2016. To support this rapid growth the government intended to fulfil its infrastructure ambitions and other requirements through private sector investment. In 2009, the total number of guest rooms was 15,000 while it was projected that a further 50,000 new hotel rooms would be available shortly. Such developments illustrated the kind of potential that induced many global hotel chains to start operations in Sri Lanka, including local partnership projects (Ravinthirakumaran and Lakshman 2010).

Given that studies show a unidirectional correlation between FDI and prices in the tourism industry, a more competitive pricing mechanism and government regulations might improve the investment opportunities in the current global business environment (Ravinthirakumaran et al. 2019; see also Mustafa and Santhirasegaram 2014). In July 2009, the Sri Lankan government entered into a Technical Memorandum of Understanding with the International Monetary Fund (IMF) which specified fiscal, monetary and external sector targets to be achieved by the government. This agreement provided foreign investors with the necessary confidence for portfolio capital inflow based on the projected macroeconomic performance and a higher return on investment (Abeyratne 2010a). The Strategic Development Projects (SDP), passed by the Sri Lanka parliament in 2008, empowered the minister in charge of the Board of Investment (BOI) to grant a five-year tax holiday period to attract FDI, with a minimum required investment of US$ 500,000 to qualify for the tax holiday (Athukorala and Jayasuriya 2012).

In the postconflict era, Sri Lanka while mired in domestic politics, continues to determine its place among trading ports and a development trajectory. For example, in 2018, on a business investment promotion in the United Kingdom, the minister stated that Sri Lanka is determined to transform its economy into a knowledge-based economy (Mena Report 2018). The successive governments since that of former President Rajapaksa's administration have facilitated FDI participation in the Western

Region Megapolis Master Plan and the National Physical Plan. While international relations with both India and China may appear to pose volatility in Sri Lanka's foreign policy, surely the fact that China remains the largest source of FDI means that the island country has to take into account national and economic interest as it carefully charts a development path (Fitch Solutions Group Limited 2020).

9.5 Vietnam

Vietnam, located in the mainland area of Southeast Asia, began to open its economy at a time when East-West tensions were easing following the collapse of the former Soviet Union and the acceptance of the Chinese capitalist model of growth. In the late 1980s, Vietnam introduced the Doi Moi economic reforms to revitalize the economy from the doldrums of its own heavy commitment in the Cambodian occupation and intermittent border wars with China. Fast forward to the 1990s and 2000s, and Vietnam has become one of the fastest growing economies in the region if not the world. Studies in recent decades on the flow of FDI have focused on spillover effects on local suppliers in the supply chain, technological transfer, benefit to locals and the varied international origins of capital investment into Vietnam as opposed to its competing neighbours (Ni et al. 2017; McLaren and Yoo 2017; Nguyen et al. 2019b).

Prior to the Covid-19 pandemic, Vietnam was poised to receive USD39 billion but estimates now hover around USD38.3 billion (*Asia News Monitor* 2020), which is still a remarkable advance in a climate of political uncertainty in relations with China on the South China Sea dispute, fluctuating relations between China and the United States over trade, Taiwan, Hong Kong and continuing territorial grabs in South China Sea. More importantly, Vietnam's delicate balance of international relationships and gravitation towards the United States creates a multidimensional and dynamic situation in its efforts to attract FDI.

Vietnam is in a comfortable position having withdrawn from the Cambodian conflict and at peace with China along the land borders, moving at breakneck speed to develop its economy. As a member of ASEAN it has enormous links to business standardizations and skills transfer from countries within the region especially from the more advanced economies of Thailand and Singapore. With over 95 million people, Vietnam's reservoir of labour and infrastructure provisions are quickly powering the country into competition with neighbouring states for foreign direct investments. Thang and Dung (2019), highlights the challenges with heavy bureaucracy within the country and lack of a system to compile FDI policies and measure their efficiency. There is also weak connection among different incentive policies, i.e. Custom duty incentives are for high-tech companies, while rental fee incentives are for all FDI recipients. Finally, many of the incentives are complicated with multiple subjective adjustments in rental fee incentives.

According to the Vietnam Communist Party (2019), there were a few challenges that the country faced when they initiated the Doi Moi reforms in 1987:

1. Poor infrastructure: No highway roads nor deep see port, no industrial zones
2. High inflation rate: around 393% at the beginning of 1989.
3. High rate of bankruptcy in state own companies: monopoly with imbalance of private segment, but state-owned companies did not work productively
4. Collapse of provincial and state funds as a result of state own company bankruptcies
5. High unemployment rate and low skilled workers.
6. Heavy bureaucracy: local governments were puzzled on how to attract foreign investments and not affecting the local economy.
7. Lack of international trade as the US still maintained trade embargo on Vietnam until 1994 (Ngan 2016)

Apparently, Vietnam needed to rectify most of these challenges in order to lure a good flow of FDI into the country. According to Nga (2019) and National Assembly (2014), the most recent policies in favour of FDI are in three specific areas: corporate income tax incentives, customs duty tax incentives and rental fee reduction.

Labor force productivity has also been shifting towards higher skill categories (Le 2020). Through those policies, Vietnam has accumulated a healthy fiscal balance and created an attractive environment for international investors, while gradually attempting to equalize the tax treatment of local and foreign invested companies (Ministry of Finance 2020, trans) (Table 9.1).

Table 9.1 Customs duty incentives period

	Standard customs duty	Incentives for FDI projects	Remarks
1991–1994 (Hoa and Van 2017; Ministry of Finance 2005)	Various depending on each good	• No tax (0%) on importing goods/facilities for fixed assets	Prioritised for importing materials for processing
1995–2000 (Hoa and Van 2017; Ministry of Finance 2005)		• No tax (0%) on exported processed commodities	Joined ASEAN Free Trade Agreement and Common Effective Preferential Tariff (CEPT)
2001–present (Duc 2017; Ministry of Finance 2005; Hoa and Van 2017)		• No tax on exported goods and facilities for hi-tech, science and technology companies and organizations in first five years of operation • Many commitments to reduce tax for various imported goods	Enhance the custom duty system by joining 17 Free Trade Agreements (FTAs)

From Table 9.1, it is noticeable that Vietnamese policies on customs duties have been moving from accumulating assets and building a strong manufacturing foundation (no tax for fixed assets) towards a more open economy with priorities for high-technology and a more skillful labour force to create a fair investing environment. By joining 17 FTAs Vietnam is now open for even more FDI flows; however, this adds impetus for local companies to improve their human resources to meet higher productivity and greater efficiency.

9.6 Discussion

There are specific stages of economic policy that had huge impacts on Vietnam and Sri Lanka FDI. For Vietnam, it is the Doi Moi era (economic restructuring) since 1987, for Sri Lanka, the post-civil war period since 2009. Both countries have favourable conditions in natural resources, geographical location and labour force but nevertheless, their foreign policies appear to play a critical role in terms of attracting FDI (Table 9.2).

Apparently from Table 9.3, it is evident that while Vietnam is doing better than the regional average, Sri Lanka continues to lag behind the its regional peers on average in receiving Foreign Direct investments. Data from the World Bank (2020) shows that Vietnam has had huge FDI fluctuations since the Doi Moi era began in 1987, with a then record high 11.9 billion USD in 1994 when the country established several favourable policies to attract FDI, a record low at 3.39 billion USD in 2005, and an all-time high record by far at 38.02 billion USD in 2019 (Vietnamplus 2019). Available statistics suggest that Vietnam has been establishing appropriate policies to lure FDI flow to the country.

Post-civil war (2009) SL established very strong political and economic ties with China and India compared to other nations which resulted in a special Free Trade Agreement (FTA) with India while China was granted special preferential opportunities to build infrastructure (i.e.: highways, power plants) projects which resulted in large amounts of FDI directed towards SL (Abeyratne 2010b). The government policies attracted FDI in the short-term, but due to lack of good governance, strong financial policies, healthy exchange rate systems, reductions in the budget deficit, trade openness and ease of doing business, etc. Weakening ties with western countries caused many global investors (private and public) to consider Sri Lanka's situation as ambiguous.

The Doi Moi era has had a huge impact on Vietnam's FDI ever since 1987. The country has welcomed foreign trade relationships with open arms regardless of partner, with the sole purpose of improving its economy. As a result, they attracted FDI sources from Korea, Japan, Hong Kong, Singapore and Thailand among 125 countries and territories investing in Vietnam (Vietnam Investment Review 2019). The country did not favour any specific one or two countries, in fact they have

Table 9.2 Synthesis of two countries' policies in attracting FDI projects

Country's policies to attract FDI flow	Sri Lanka	Vietnam
Reduce tax	Mainly Indian and Chinese FTAs, and main highlight is Tax holidays for longer period combined with other facilities (Ravinthirakumaran et al. 2015)	17 FTAs, various incentives on corporate tax, custom duty and rental fee (Thuan 2019)
Obtain healthy and sustainable level of FDI	Priorities were tourism and infrastructure, and other areas considered were commerce, naval, aviation, knowledge and energy (Abeyratne 2010b)	Priorities in manufacturing, infrastructure development; high-tech; green energy (Hoa and Van 2017)
Seek more effective governance	Reducing the bureaucratic and simplifying the existing complicated tax system (Nenova 2018)	Reducing paper works and simplified tax system but still somewhat complicated (Nga 2019)
Enhance physical infrastructure	Public–Private Partnerships (Ravinthirakumaran and Lakshman 2010)	Through mainly state-owned companies but starting to involve private segment (Tap Chi Tai Chinh 2018)
Improve trade openness	Mostly India and China due to deteriorated relationship with western countries (Ravinthirakumaran and Lakshman 2010)	Through any possible foreign investors
Human resource enhancement and local resource advantage	FDI projects were mainly focused around cheap labour force rather than other factors such as the local reserve (i.e. oil) (Abeyratne 2010b)	FDI projects using local labour but barely using local resources (Nga 2019)
Appreciating real exchange rate	Not directly driven by market forces, many times during this period (Abeyratne 2010b)	Driven by state adjusted accordingly to the global exchange (Do 2020)
Domestic investment vs foreign investment	Foreign investments were given more preferential opportunity than domestic investments (Abeyratne 2010b)	Through corporate tax income incentives, progressively making the 2 sides equalised (Ministry of Finance 2020)

signed 17 FTAs so far, most recently with Europe and the US expressing openness to global investors. Further, the single party rule creates an advantage in managing macroeconomic factors to attract FDI such as maintaining a healthy exchange and inflation rates.

Table 9.3 Foreign Direct Investments in Sri Lanka & Vietnam in US$ Billion (The World Bank 2020)

	1970	1975	1980	1985	1990	1995	2000	2005	2010	2015	2019
Sri Lanka	0	0	1.1	0.4	0.5	0.4	1.1	1.1	0.8	0.8	–
South Asian Region	0.1	0	0	0.1	0.1	0.6	0.7	1.0	1.5	1.8	1.6
Vietnam	0	0	0	0	2.8	8.6	4.2	3.4	6.9	6.1	–
East Asia & Pacific	0.6	0.4	0.4	0.3	0.7	1.1	2.1	1.8	2.9	2.8	1.8

9.7 Conclusion

History and existing literature suggest that FDI brings many positive benefits to recipient countries, including technology transfer, better local market competition, higher quality labour force (through training programmes) and good revenue from corporate tax. With that in mind, most developing countries have been trying to attract a good flow of FDI. However, questions remain as to how well they have done, given the constrained conditions each country has. In this regard, this paper's critical finding is that the diplomatic relation of each country play a crucial role in attracting FDI. The finding may give readers insights of what Vietnam and Sri Lanka have been doing to boost their economic growth by attracting FDI and why each country departing at somehow similar starting point of its own political and economic challenges ended up with different results.

Jensen (2012) in a study showed that there are inherent risks involved when assets or holdings are susceptible to regime changes. The number of expropriations of MNC assets in autocratic systems was four times higher than in democratic regimes during the period 1960–1990. If we were to juxtapose this notion about regime changes and nationalism as one of the causes of expropriation, a mixing of international relations in this day and age might also throw up some interesting posturing and risks (Barry and DiGiuseppe 2019). A regime that favours one country's investments over the other might be biased politically in its policy to extend contracts to FDI that are actually investing in the infrastructure, and that may lead to downline developments and progress for the country that is backed by a foreign power. This type of exchange and regime patronage was not quite clearly enunciated in the literature, but international power rivalry certainly has an impact on the direction of regime and institutional frameworks.

Observations show that while Vietnam and Sri Lanka tries to improve transparency in governance and the financial system which are important factors that foreign investors are keen to see happen. While Vietnam increased its trade openness, signing 17 Free Trade Agreements and establishing massive incentives for foreign investors from 125 countries and territories, Sri Lanka entered into eight trade agreements (both bilateral and multilateral) and were in the process of signing them with many other countries (Central Bank 2019). The FDI statistics on Sri Lanka show the average FDI influx is around US$ two billion annually and thus far the largest amount of FDI

it has attracted was US$ 2.85 billion in 1997; comparatively Vietnam attracted its highest record of US$ 38 billion in 2019.

This chapter's finding records the crucial role of diplomatic relations that both countries have been following, to suggest that developing countries should make themselves transparent and neutral in the eyes of investors, creating equal opportunities to foreign direct investors. Unless countries take measures to implement and sustain the factors favouring investor friendly climate for investments the governments would continue to struggle to attract large FDI which is evident in this chapter.

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Part III
Designing & Planning for Urban Communities

Chapter 10
Addressing Food Security in Constrained Urban Environments

Jacob Wood, Caroline Wong, and Swathi Paturi

Abstract Our research investigates how the issue of food security is addressed through an effective urban planning strategy and legislative agenda in resource-constrained urban environments. As part of our study, we assess the degree to which urban planners have embraced the issue of food security. We also examine the importance of urban agriculture in facilitating narrower supply chains, which enhance food security. Finally, to further our understanding of the field, this study provides urban farming examples from Canada, Brazil, and Singapore to shed light on how a combination of community and NGOs support, public and private sector investments, as well as specific government regulatory provisions can help alleviate most of the food security challenges that resource-constrained environments present.

Keywords Urban environments · Urban planning · Food security · Urban farming · Policy development

10.1 Introduction

The urban landscape is experiencing unprecedented change, with more than half of the world's population now living in urban areas (Zeng et al. 2016). Since 1950, the urban population has increased from 751 million to 4.2 billion in 2018 (UN 2018). This urban drift is placing significant stresses on key infrastructure and natural resources such as land, water and energy, the likes of which are crucial for the production, transportation and consumption of food (Montgomery 2008; McDonald et al. 2013, 2014). Past research has shown that as urban populations increase, demand for resources like land, water and food also increases (Rashid et al. 2018; Huang et al. 2010). Unsustainable developmental models that attempt to accommodate urban

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populations have resulted in damaged ecosystems and environmental degradation (Heshmati et al. 2019).

One of the most important factors that has emerged from constrained urban environments has been the issue of food security. Defined as a person's ability to have physical and economic access to sufficient, safe, and nutritious food, food security is an important means supporting the dietary needs for an active and healthy life (FAO 2006). Food security research has shown that strong supply chains help to improve the physical health of people, while a lack of food security has been positively related to lifestyle disorders such as diabetes and obesity (Yau et al. 2018). However, the need to have secure access to food goes beyond simply ensuring that everyone has a safe supply of food to eat. The issue has been a prominent feature within the United Nations Sustainable Development Goals (SDGs) for the year 2030 initiative (Breene 2016). Its inclusion highlights the important role that food security plays within other socio, economic and environmental factors such as urbanization, growing population, climate change and poverty. Any challenging circumstances or constraints caused by these factors limit an area's ability to achieve food security. In order to address such concerns, innovative approaches are needed (Anderson and Kolko 2011).

One important innovative approach to secure food security is through the development of well-structured urban planning initiatives that drive urban agricultural production. Defined as 'growing and raising food crops and animals in an urban setting for the purpose of feeding local populations' (Pfeiffer et al. 2013, p. 79), urban farming has grown to be an important feature of the modern urban planning. Over the past decade, urban agriculture has evolved from a leisure or personal activity to that of an economic activity on the cutting edge of technological innovation. Its growing appeal around the world (Yuan et al. 2019) also reflects government attempts to overcome food safety and land resource issues, while also providing sustainable urban living environments that manage the food security threats posed by rapid urbanization (Shamshiri et al. 2018). However, in order to better support urban agricultural activities, urban planners need to do more to accommodate the issue of food accessibility in cities (Slade et al. 2016). Despite some progress being made, many urban areas still experience so-called 'food deserts' in which access to healthy food outlets is limited (Slade et al. 2016).

Appropriate urban planning can therefore go a long way to preventing the presence of these deserts by increasing the level of connectivity that exists between urban areas and rural agro-industries. Given this context, our research seeks to understand the important role that urban planning initiatives, such as urban agriculture, can play in alleviating food security concerns in cities. In order to do so, we adopt a qualitative informative approach by exploring the following research questions (RQ):

RQ1: How can urban planning facilitate urban agricultural opportunities?
RQ2: What role does urban agriculture play in addressing food security concerns?
RQ3: What policy and legislative frameworks have been developed to enhance food security efforts in urban areas?

This food security study differs from earlier works in several ways. Firstly, it examines the role of urban planners within the urban agricultural landscape. Secondly, we assess the important role that urban agriculture plays in alleviating urban food insecurities. Finally, our study highlights urban farming examples from Canada, Brazil, and Singapore to illustrate how government regulatory provisions can help alleviate some of the food security challenges that urban environments present.

The remainder of our study is as follows, Sect. 10.2 addresses the role that urban planners play in addressing urban agricultural opportunities (RQ1). Section 10.3 examining the role that urban agriculture plays in addressing food security concerns (RQ2). Section 10.4 provides examples of various policy and legislative frameworks that have been developed to enhance food security efforts in urban areas (RQ3). Finally, Section 10.5 documents the key results and provides a series of concluding remarks.

10.2 The Role of Urban Planners Within the Urban Agriculture Landscape

Urban planning links health outcomes and place at a local level (Slade et al. 2016) with urban planners playing a pivotal role in creating the types of healthy living environments that provide sustainable and equitable access to secure and healthy sources of food (Morgan 2009). However, as Pothukuchi and Kaufman (2000) note, while urban planners have done much to improve land use, housing, transportation and a range of environmental factors, little interest has been given to addressing the issue of food security (Cassidy and Patterson 2008). Moreover, within the context of urban agriculture, Thibert (2012) states that local government urban planners are ill-equipped to deal with the practical and policy aspects of the role. However, Clancy (2004) provides an alternative perspective, by suggesting that more needs to be done by food advocates to convince planners of the benefits of their involvement in developing agricultural opportunities. An Australian study by Allender et al. (2009), found that local governments can feel powerless to make a change, noting evidence of multiple urban planning barriers when endeavouring to address the complex challenge of food security. In other research, Morgan (2009) notes that planners go to great lengths to plan for water access without considering a community's need for secure food supplies. While others note that it was not until the academic community and several international organizations criticized many urban planning practices that more of an emphasis was given to the issue of food security (Raja et al. 2008).

In recent years, the literature on urban planners has evolved, with the identification of three key interfaces between urban planning and the improvement of food security outcomes, these include: strategic planning and policy development, land use regulation and infrastructure development (Slade et al. 2016). Research highlights the ways in which urban planning can influence the location and establishment of urban farming activities, like community gardens and fresh food stalls (Slade et al.

2016). These initiatives provide a range of social, environmental, and economic benefits, including the productive use of vacant spaces, enhanced liveability, alternative income sources, the alleviation of poverty, and better health outcomes (Mougeot 2006; Thompson et al. 2007). In order to develop and grow these urban farming initiatives, urban planners must work with local governments to plan, zone, and design appropriate guidelines and living environments to be successful (Castillo et al. 2013). The advent of the urban farming era has enabled a smoother integration of food into urban planning agendas. With growing worldwide interest in urban farming and the efforts of local governments to improve local food security, land is being zoned for agriculture and allied activities in urban areas. However, some researchers are still sceptical about the benefits of urban farming with some noting that it may even escalate food inaccessibility by benefitting privileged communities who prefer fresh food (Horst et al. 2017). Furthermore, urban farming only addresses the food availability aspect of food security. Some academics suggest that planners can play a proactive role in improving food access by strategically locating supermarkets, farmers markets, corner stores and other food destinations (Raja et al. 2008). Also in communities where a lack of access to food is prevalent, due to poor public transportation and low economic status, planners can empower these communities with better connectivity to the food systems. For example, studies in the US have shown that low-income communities have to travel for 19.5 minutes to reach a supermarket, whereas in high-income neighbourhoods, the commute time was only 15 minutes (Hodgson 2012).

Planners can also address the poor rural–urban linkages, which play an important part in increasing 'food miles' and the carbon footprint of the food itself, while also making the food system vulnerable to supply chain disruptions. Improving market access, building urban infrastructure for transport as well as food storage facilities are some of the steps that planners can take to address such concerns. The City Region Food Systems (CRFS) planning concept is one that allows for holistic planning right across the rural–urban food system landscape (American Planning Association 2007; Brinkley 2012). The CRFS programme deals with a wide array of areas, ranging from food production to food waste, in which the focus is on managing not only land use concerns but also resources such as transport and water (American Planning Association 2007; Brinkley 2012). While planning for food security, urban planning must also take into consideration informal food systems such as street food vendors, which are common in developing countries. Furthermore, effective urban planning also helps to make sure that resources are utilized in the most sustainable manner possible (Cabannes and Marocchino 2018). The concept of the circular economy can also be applied successfully if planners channel food waste into agricultural producing regions and efforts are made to reduce landfill usage (American Planning Association 2007).

In summary, the recent literature suggests that urban planning plays an important role in advancing food security in urban areas. It is particularly important in identifying patterns of inequitable access, facilitating urban food supply and embedding food security principles into policies and plans (Slade et al. 2016). The role that

urban planners play, can be significantly enhanced through the implementation of integrated and consistent food security policies at all levels of government.

10.3 Urban Agriculture and Its Impact on Urban Food Security

As the world becomes increasingly urban, cities will face higher demand for natural resources and the potential for unsustainable levels of economic development (Bentham 2012; Thomaier et al. 2015; Dodman et al. 2017). In order to address these concerns, much research has focused on the important role that urban agriculture can play in achieving food sovereignty and improving local economic development opportunities, while at the same time reducing the size of the carbon footprint across the urban landscape. Urban agriculture represents an industry which makes, processes, and sells food in response to the daily needs for urban consumers, using urban and peri-urban buildings and land (Pölling 2016; Benis and Ferrão 2017). A key aspect of urban agriculture is vertical farming, a technique that features prominently in the urban farming literature. In principle, it is a simple concept; farm up rather than out (Despommier 2013, 2014). An assessment of the literature shows that vertical farming occurs in two main types (Despommier 2014). The first consists of tall structures in which several layers of growing beds are stacked on top of each other, all of which utilize artificial LED lights. This is the most common form of vertical farming, with many cities having implemented this model in old and new buildings as well as warehouses that have been repurposed for agricultural activities (Despommier 2013; Al-Kodmany 2018). The other major form of vertical farming takes place on the rooftops of commercial and residential structures as well as on restaurants and grocery stores (Despommier 2014; Touliatos et al. 2016). In both instances, the logic of vertical farming is simple: produce more food on less land (Muller et al. 2017). Moreover, the same rationale used in Singapore, in which homes and offices are atacked into limited and expensive land, can be applied to farming. The technologies used in vertical farming include hydroponics, aeroponics and aquaponics (see Table 10.1).

Several studies also highlight the important role that urban agriculture plays in improving urban food security (Kalantari et al. 2020), increasing fruit and vegetable consumption (Taylor and Lovell 2012; Mansfield and Mendes 2013), facilitating community interactions (Armstrong 2000; Morgan 2014) and providing access to fresh food in food deserts (Segal 2010). Moroever, from a specific vertical farming perspective, other works highlight its role in growing produce in a more efficient and sustainable manner than traditional forms of farming (Al-Kodmany 2018). In terms of food security, Despommier (2010) estimates that a 30-floor building spanning one square block, utilized for vertical farming purposes, can provide the calorific intake for 10,000 people (based on 2,000 calories a day per person diet). Furthermore, as the food would be produced inside city boundaries, the distance it would have to travel

Table 10.1 Technologies used in urban farming

Type/technology	Farming example
Hydroponics	Oh Chin Huat Hydroponic Farms: Singapore Nuvege Plant Factory: Kyoto, Japan
Aeroponics	AeroFarms: USA Ky Greens Farms: Singapore
Aquaponics	Ecoponics: Iceland The Plant Vertical Farm: Chicago, IL
Greenhouses (Controlled Environment Agriculture)	Green Sense Farms: Portage, Indiana and Shenzhen, China AeroFarms: Newark, New Jersey

Sources Kalantari et al. (2017, 2018)

is also drastically reduced (Suparwoko and Taufani 2017). This shrinking of the supply chain would also greatly enhance food security. Other studies highlight urban farming's ability to save water and energy use while also reducing pollution emissions (Healy and Rosenberg 2013), and provide new employment opportunities. In addition to this, other studies have highlighted ecological benefits through the 'greening' of urban environments, decreasing urban heat-island effects and providing wastewater diversion (Chen and Wong 2005; Grewal and Grewal 2012; Haberman et al. 2014; Johnson et al. 2015). Nonetheless, despite these benefits, Despommier (2010) notes that vertical farming is not a panacea for overcoming all food security issues. A key criticism of vertical farming approaches is the energy costs associated with helping the plants to grow (Al-Chalabi 2015; Specht et al. 2014). Such costs greatly impact the sustainability gains that are often touted as an important benefit of urban agriculture (The Economist 2010). There are also water issues surrounding vertical farming businesses that can profoundly influence the success of the venture (Perez 2014). In order to overcome this issue, aeroponics and hydroponics technologies have been used that help to save up to 95% of total water used (Kalantari et al. 2018). They can also help to remove wastewater, which is potentially hazardous to the environment and to human health (Voss 2013). However, these technologies are still expensive to set up and require significant expertise in terms of their monitoring and upkeep. Despite its various advantages and disadvantages, many cities around the world have pioneered their own approaches to urban farming as a means of achieving food security. The most notable examples of which include Singapore, Hong Kong, New York and Dubai.

In order to ramp up its local food production, the Singapore government implemented the '30 by 30' policy agenda, which seeks to raise local production from less than 10% today to meet 30% of Singapore's nutritional needs locally by 2030 (CNA, 7 March 2019a). This policy platform has also coincided with a tremendous increase in the uptake of vertical farming initiatives across the island. The most significant of

which is the Sky Greens project, a world leader in this area. In 2019, the Singaporean Sky Greens urban farming enterprise received the world's first national certification standard for organic vegetables grown in urban environments. In other developments, Hong Kong now has over 60 urban farming enthusiasts who farm terraces actively (Robson 2017), while Dubai has invested US$40 million in urban farming initiatives so as to ensure as much fresh food as possible is served for its national airline Emirates (Gray 2018). New York is also an active player in urban farming with its Aero Farms supplying leafy greens to Singapore Airlines (Slotnick 2019). It is also home to various other large players such as Bowery and Brooklyn Garage, while smaller urban centres like Detroit have also adopted urban farming practices, with the movement now being embraced by some 800 million urban residents globally (FAO, n. d).

10.4 Policy Frameworks and Case Study Analyses

Establishing shorter supply chains that enhance food security in urban areas has received more attention in recent times. More specifically, the World Health Organization (WHO) and the United Nations Food and Agricultural Organization (FAO) have launched programmes like 'Healthy Cities' and 'Food for the Cities' to endorse the importance of urban food security (WHO, n.d.; FAO, n.d.). In order to achieve greater food security, the FAO has created guidelines for integrating food security mechanisms within urban planning frameworks (Cabannes and Marocchino 2018). One such example has been the establishment of the Milan Food Policy Pact, which was signed in 2015 by more than 160 cities from around the world. The Milan Urban Food Policy Pact forms the first international protocol that calls for the development of more sustainable and resilient urban food systems. The aim of this pact is to reduce the impact of food loss and waste (FLW) on natural resources, the environment and sustainable food production in urban centres (FAO 2015). In association with this, an e-book titled 'Milan Urban Food Policy Pact. Selected Good Practices from Cities' containing 49 good practices was published along with this Pact (FAO 2015).

While analysing the legislative aspects of planning food systems and security, it must be stressed that the local government's role in planning is as vital as that of state or federal governments. Local governments are often in control of how land is used, where residents are housed, how commercial activities take place and establish necessary local socio-economic linkages (Hodgson 2012). The local community, NGOs, and investments from both the private and public sector are also critical in helping to shape urban planning developments and the implementation of effective food security initiatives. The remainder of this section provides a number of case studies which outline how effect policy frameworks have been implemented.

10.4.1 The Case of the Greater Golden Horseshoe (GGH) Region, Toronto

The GGH region is one of Canada's most populated and fastest growing regions. With a current population of 9 million, the area is projected to grow to 13.5 million people by 2041 (Ontario Government, n.d.). The GGH City Region includes the City of Toronto and 15 surrounding counties. It is Canada's most important economic engine, generating two thirds of Ontario's and one-quarter of Canada's Gross Domestic Product (Ministry of Municipal Affairs and Housing, n.d.). Its farmland represents one of the most important economic sectors of the region, contributing $11 billion and 38,000 jobs to Ontario's economy (Ontario Federation of Agriculture 2015). How growth is accommodated in these areas will determine the future of agricultural lands and the agricultural economy in the GGH.

The core problem of the GGH region, is the competing demands between housing, infrastructure needs, and preservation of prime agricultural land. Food insecurity is another significant challenge for Toronto as some communities face difficulties in accessing healthy food, particularly low-income households and individuals and families reliant on social assistance (Toronto ca, n.d.). It is reported that in 2017, almost one in five (18.5%) Toronto households experienced marginal, moderate, or severe food insecurity, which is significantly higher than the provincial average of 14.1% in Ontario, excluding Toronto (Toronto ca, n.d.). The 2015 'Cultivating Food Connections' study for Toronto shows that insufficient funding is going to local farmers or local communities (FAO, n.d.).

To tackle these constrained urban challenges, a review was conducted with various stakeholders, which resulted in Toronto adopting a range of food security policies that facilitated more sustainable lifestyles and better access to fresh food for its residents. Eight key policy recommendations emerged through the CRFS project. Each of which were assessed and then grouped in order to identify appropriate priorities. The top policy recommendation was to create mid-scale infrastructure and provide financial, regulatory, public food procurement and educational supports, such as food hubs, to further develop regional food flows (FAO, n.d.). Associated recommendations include providing financial resources, developing appropriate regulations and increasing related educational and research support to foster mid-scale infrastructure (FAO, n.d.).

The above policy recommendations demonstrate that the City Region Food System (CRFS) approach facilitated a more integrated, just, and efficient food system in the Toronto Region as linkages between existing networks deepened, including the Toronto Food Policy Council, Greater Golden Horseshoe Food and Farming Alliance, Toronto City Council, Toronto Public Health and Economic Development (Miller and Blay-Palmer 2018). As a result, several initiatives were rolled out, including the Urban Agriculture tours for rural members and the region/peri urban tours for urban practitioners, the Food, Farming and Health professional development measures, as well as the data sharing and collaboration strategies to increase the procurement of local food in City institutions (Miller and Blay-Palmer 2018).

The GGH planning framework is undoubtedly a major step forward in the direction of managing growth and preserving farmland in the region. However, there are major challenges linked directly or indirectly to land-use planning which have policy and legislative implications. One of the challenges arises due to expanding urban developments, which have been encroaching on agricultural lands. These changes reflect a new planning framework that encourages new urban development opportunities (Ontario Federation of Agriculture 2015).

In line with smart growth planning principles and global climate change, there is a need to integrate agriculture as a permanent feature of the regional landscape and farming as an essential component of the economy and cultural heritage (Ontario Federation of Agriculture 2015). This is consistent with the principles of ecological planning, which are becoming increasingly important as communities seek to provide a more holistic approach to environment conservation (Ontario Federation of Agriculture 2015).

10.4.2 The Case of Belo Horizonte in Brazil

Belo Horizonte, the capital city of Minas Gerais state, is the fourth largest city in Brazil with a population of 6.08 million in 2020 (Macrotrends, n.d.). In the early 1990s, the city suffered high rates of poverty and hunger. Figures from the time estimated some 38% of families were living below the poverty line, while 18% of children aged less than three years were found to be malnourished (FAO, n.d.).

In 1993, the newly elected municipal government of Belo Horizonte initiated a new policy agenda, which included changes to land use legislation and the development of the Belo Horizonte Food Security Program, which sought to combat poverty-related food inaccessibility issues (Deldago 2018; Rocha and Lessa 2010). A core component of the programme is the Municipal Secretariat of Supplies (Secretaria Municipal de Abastecimento—SMAB), an agency created by the City Government to prevent and reduce malnutrition among vulnerable groups (FAO, n.d.).

The SMAB's programmes have been quite successful, reaching close to 35% of Belo Horizonte's population (Pessoa and Machado 1999), mostly low-income families and individuals. The programme not only significantly improved food security, its urban planning initiatives also made the city a pioneer in urban food security. Besides food security, Belo Horizonte's efforts also focused on equitable access to food and social justice (Rocha and Lessa 2010). The programme assisted those in need, addressing partnerships with private food players as well as a focus on urban agriculture. The main partners include other government departments (Public Health, Education and Environment), the private sector (small farmers, food manufacturers and store operators), NGOs (the Citizens' Action Campaign, the Network for Exchange in Alternative Technologies and others), philanthropic groups (running day-care centres, community centres and nursing homes), community associations, and the University of Minas Gerais. The city also introduced comprehensive food waste management practices and a highly effective food and nutrition education

programme, as well as an outreach restaurant-based food supply initiative that provided meals to the homeless and destitute (FAO 2018).

This case study provides a good example of successful food security policy. The establishment of the Municipal Secretariat of Supplies (Secretaria Municipal de Abastecimento—SMAB) has played a pivotal role in significantly reducing the levels of hunger and malnutrition in Belo Horizonte, while at the same time driving economic growth through small-scale agricultural holdings in the region (Future Policy Organisation, n.d.). Nonetheless, the question remains as to whether this kind of success can be replicated in other parts of Brazil?

10.4.3 The Case of Singapore

Singapore is an interesting case when it comes to food security policy and legislative frameworks. As a densely populated metropolis of 5.703 million in 2019 (Department of Statistics, Singapore 2020) the country is largely devoid of any natural resources and as such is highly dependent on food imports from around the world. Given this backdrop, it is perhaps surprising that Singapore has topped the Economist Intelligence Unit's Global Food Security Index of 113 countries in 2018 and 2019 (The Straits Times, 10 December 2019). Prior to 2018, of the countries recorded, Singapore had been in the top three positions of the index's measures of affordability, availability, quality, and safety of food source.

Researchers such as Dr Cecilia Tortajada, a Senior Research Fellow at the Lee Kuan Yew School of Public Policy's Institute of Water Policy attributed Singapore's high ranking in food security to its planning and ability to ensure a safe, accessible and affordable supply of food (The Straits Times, 10 December 2019). With agricultural land, only making up 1% of Singapore's total land area (Choo 2019) it is little wonder that it imports more than 90% of the food consumed in the country. Its need for foreign sourced food has seen Singapore develop strong trading ties with more than 160 countries around the world (SFA 2016/2017). Given this reliance, any disruption to its food supply chains through the impact of climate change, rising sea levels and temperatures or an outbreak of diseases could prove extremely damaging for Singapore. Given such concerns, the Singaporean Government and the private sector have made significant investments to secure strong and effective food supplies.

The early adoption of urban farming in Singapore has been aided by innovative research technologies (Teng and Escaler 2010) as well as strong support through the launching of initiatives such as the Environment and Water Resource Ministry's ambitious '30 by 30' goal, which as mentioned earlier, seeks to produce 30% of Singapore's nutritional needs locally by 2030 (Ai-Lien 2019). In order to achieve this, the Environment and Water Resources Ministry (MEWR) detailed four ways in which food security can be achieved. These included the use of technology to grow more with less, unlocking physical spaces for farming, developing local talent and getting consumers to support locally produced food (Mahmud 2019). These announcements have in turn led to significant investments in indoor agricultural innovations and

the establishment of business accelerators and incubators that provide investment opportunities and grants to start-ups working in the urban farming industry. More specifically, the Singapore Government has partnered/co-invested with seven accelerators to invest further in food and agriculture technology start-ups (Chong 2019). These efforts have resulted in significant growth in vertical and rooftop farming, in particular the successful Skygreens, and Oh Chin Huat operations, which has seen Singapore now produce 13% of the total amount of leafy greens consumed locally (Choo 2019).

The Government initiatives also came in the form of funding for R&D investment in the agriculture and food production sector. In line with the newly announced target to produce 30% of the nation's nutritional needs by 2030, the Government will invest $144 million (SGD) from its Research, Innovation and Enterprise 2020 (RIE 2020) plan to ramp up research and development activities in the agri-food industry (Tang 2019). To upskill local farming capabilities, institutes of higher learning, such as Temasek Polytechnic have launched new institutions like the Aquaculture Innovation Centre (AIC), which opened in June 2019. The AIC is the first ever Centre of Innovation (COI) funded by Enterprise Singapore (a statutory board under the Ministry of Trade and Industry in Singapore) that adopts an inclusive and collaborative approach involving a consortium of 9 research institutes, agencies, universities, and polytechnics in Singapore (Temasek Polytechnic, n.d.).

From a local community perspective, Singapore's public housing environment provides the perfect platform from which local food production can be increased. A Singapore-based study by Astee and Kishnani (2010), showed that if the rooftops of public housing estates in Singapore (HDB's) are used for food production, local production can be increased to 35.5% from its current 5.5% level; while at the same time, reducing carbon emissions, and enhancing new biofuel production opportunities. In addition, when compared with other cities globally, Singapore's unique tropical climate means that rooftop-farming operations are very feasible. Instead of using expensive lighting for growing crops, Singapore can harvest natural sources of light to grow vertically farmed produce (Wilson 2005).

The current COVID-19 situation in 2020 underscores the importance of local food production as part of Singapore's strategies to ensure food security. In recent times, the Singapore Government has offered local farming ventures various grants and incentives which seek to increase local production capabilities. This includes providing a $30 million (SGD) grant to support the production of eggs, leafy vegetables and fish, while also identifying alternative farming spaces, such as industrial areas and vacant sites (The Straits Times, 8 April 2020).

However, for a small city-state like Singapore, there are challenges relating to urban farming, which it needs to surmount. For example, land scarcity remains a challenge, exacerbated by a complex and restrictive regulatory framework related to land use (Low 2019). Building human capacity is another challenge that relates to many cities with most of the farm's employees being brought up as urban dwellers (Low 2019). Many lack the experience and training to manage urban farms. Skilled-labour to service these farms is also of concern, for although the vertical farming system is automated, the harvesting and packing of vegetables is carried out manually

by foreign workers. There is also a general lack of awareness about and support for more sustainable consumption patterns among the Singapore community, which further hinders the advancement of vertical farming opportunities. Moreover, how much will consumers be willing to pay in order to purchase organic vertically farmed vegetables over traditionally farmed ones? (Khoo 2020).

The case of Singapore illustrates the significant role played by government in supporting initiatives for food security in a highly constrained urban environment. Its ability to accelerate the development of a tech-savvy workforce in agriculture and food processing, backed by appropriate investments in research and development, through its higher education institutes and ASEAN centres of expertise in food production and processing (CNA, 10 March 2019b) have helped Singapore scale the constraints of its urban environment. Moreover, unlike the Bel Horizonte case study in Brazil, in which civil society participation, NGOs and community groups were instrumental in leading change. The success of Singapore's urban environment is very much driven by strategic urban planning initiatives and specific government regulatory provisions that help alleviate some of the food security challenges faced by the city-state.

10.5 Conclusion

In the coming decades, climate change, urbanization and an expanding global population with growing income inequalities will make food security even more challenging. Coupled with the interdependency of the global economies, any disruption in supply chains wrought about by unforeseen global events such as the COVID-19 pandemic in early 2020 will only serve to exacerbate the food security issue further. In an attempt to better understand how the issue of food security can be overcome our study addressed three research questions: (1) How can urban planning facilitate urban agricultural opportunities? (2) What role does urban agriculture play in addressing food security concerns? (3) What policy and legislative frameworks have been developed to enhance food security efforts in urban areas?

Firstly, our study identified the important role that urban planners in creating an environment that facilitates the establishment of urban farming activities, like community gardens and fresh food stalls. Such initiatives provide a range of social, environmental, and economic benefits which are instrumental in helping to not only alleviate poverty but also provide better health outcomes for some of the most vulnerable members of society. In order to develop and grow these urban farming initiatives, urban planners must work with local governments to plan, zone and design appropriate guidelines and living environments to be successful. Secondly, our research showed the important role that urban agriculture can play in alleviating food security concerns in constrained urban environments. In particular, its ability to shrink the length of the supply chain, conserve water and energy use while also reducing pollution emissions, green urban environments, and decrease urban heat-island effects. Nonetheless, despite such benefits, some forms of urban farming have been critically

assessed by scholars, in particular, vertical farming which has been criticized due to its high energy and start-up costs. Thirdly, by providing a series of case study examples, this study outlines the important role that civil society participation, NGOs, and community groups play in driving policy change, particularly in the Brazilian City of Bel Horizonte. While the success of Singapore's urban environment has been driven by strategic urban planning initiatives and the development of effective government regulations, the likes of which, have been instrumental in alleviating the food security challenges faced by country.

In summary, the development of urban infrastructure with rural–urban linkages is essential for food security. Moreover, governments and urban planners must work together to ensure that food retail establishments, zoning land for urban farming activities, improving urban transport infrastructure, market linkages, and efficient resource management practices are conducted in ways so as to ensure the creation of urban environments that have high levels of food security.

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Chapter 11
The Death and Life of a Tropical Landscape: Envisaging a New Melaka, Malaysia

Laura Cipriani

Abstract The UNESCO heritage city of Melaka, Malaysia, is a historically rich centre, but one in which environmental, urban, and above all social crises are currently taking a heavy toll: building speculation, strong touristic spatial imbalances, reclamation work along the coast with immense dredging operations, deforestation of coastal mangroves, soil erosion, sea-water incursion, water pollution, and hydraulic risk are the heavy price paid for the city's rapid and destructive development. In addition, it is also evident that behind the changes in the built landscape lies racial and religious discrimination against certain ethnic minorities. In this context a small fishing community, descants of the early Portuguese colonizers, merits special mention as pharaonic reclamation projects, and dredging work are destroying the marine ecosystem upon which the already severely compromised livelihood of these fishermen depends. This article aims to present a series of design scenarios to tackle complex issues at city scale. Design works start from the belief that the landscape is not only an environmental resource, but also a factor that can become an economic resource, a major driving force for alternative development of the territory and its cities and people.

Keywords Tropical landscape · Reclamation projects · Melaka city · Landscape economies · Design scenarios

11.1 The 'Death' of Tropical Landscape

It is not easy to define a tropical landscape or the conditions that determine its demise. Firstly, the term 'landscape' has been amply and variously debated and defined in accordance with the discipline adopting the term. However, we can, at least, affirm that a landscape is the end result of a long temporal process represented by the actions of human beings and natural forces.

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Secondly, the adjective 'tropical' also lends itself to different interpretations as it refers to a large geographical area. Literally, 'tropical' means belonging to or typical of the tropics. The term originally derived from the nineteenth-century definition of the tropics, in which Central and South America barely deserved mention, but now it has come to signify a much broader geographical area, namely a swath of the Earth between the Tropic of Cancer, 23 ½ degrees north of the Equator and the Tropic of Capricorn, 23 ½ degrees south of the Equator. Although the adjective includes a variety of different landscapes, it usually connotes the warm and humid climate engendering the lush vegetation associated with 'tropicality', and conjuring up an image of a wild nature, or the land of rich biodiversity depicted in the Garden of Eden.

The tropical landscape discussed in this paper is geographically limited to Southeast Asia, specifically the city of Melaka in the Malay Peninsula. We will approach the term 'landscape' by adopting a holistic approach that encompasses historical processes, ecological and physical transformations, and social and economic systems.

We shall relate the landscape's past and the present demise—not only a biophysical but also the economic and spiritual 'demise' of the local populations—and we will also try to formulate a possible new 'life' and hope for Melaka and its people.

11.1.1 The 'Death' of the Natural Heritage

When Alfred Russel Wallace, a famous naturalist and explorer, arrived in the Archipelago of Melaka in 1809, he described a city lush with palms and fruit trees whose inhabitants were Portuguese descendants, Chinese and officers of the English administration.

'The old and picturesque town of Malacca is crowded along the banks of the small river, and consists of narrow streets of shops and dwelling-houses, occupied by the descendants of the Portuguese, and by Chinamen. In the suburbs are the houses of the English officials and of a few Portuguese merchants, embedded in groves of palms and fruit trees, whose varied and beautiful foliage furnishes a pleasing relief to the eye, as well as most grateful shade' (Wallace 1890, pp. 19–20).

Melaka grew up as a port and multi-ethnic city where two civilizations, the Indian and the Chinese, met (Widodo 2004, 2011). Its geographically strategic position, between China, India, and Indonesia, and favourable monsoon winds enabled the settlement to develop into a cosmopolitan city based on maritime trade, and which since the beginning of the fifteenth century had become predominantly Muslim. Colonization began first with the Portuguese (sixteenth century), then the Dutch (mid-seventeenth century–mid-nineteenth), and later the British (mid-nineteenth–mid-twentieth)—British domination ending with the city's declaration of independence in 1946 and subsequently with that of Malaysia in 1957.

Fig. 11.1 Cantino planisphere, 1502 (*Source* Biblioteca Estense, Modena, Italy)

The sea and coastal mangrove forests constituted the natural elements that characterized early maps and the historical imaginary of cities. At the time of the Portuguese conquests when the galleons were setting forth to discover Asia, Melaka was nothing more than an unknown destination recorded on the map of Cantino (Fig. 11.1), one of the world's first maps, dated 1502, that depicted lands for future conquest. Southeast Asia was represented as a green triangle, dominated by rain forests with mangrove coastlines.

In Pedro Reinel's Atlas Miller of 1519, Melaka is portrayed with palm trees inland and a coast rich with rivers, mangroves, and islets, including a few golden ones (Fig. 11.2). In 1507, Martin Waldseemuller's cartography illustrated Melaka as a lush land with abundant animal life testifying to its rich coastal biodiversity ('ibi sunt multa animalia').

Today, the image of Melaka city, with its strong links to the sea, a luxuriant nature and a multi-ethnicity has undergone profound change.

Melaka's designation as a UNESCO heritage site in 2008 has transformed the city and its inhabitants: in 2017 there were more than 16 million tourists—four times more than its visitors in 2005. This accolade has certainly produced prosperity but also brought about strong spatial imbalances—the gentrification of the historic centre, with the progressive exodus of its residents and activities—and temporal imbalances—the city comes alive principally at weekends.

With the rapid arrival of tourism the city began to experience environmental, urban, and above all social crises that are exacting a heavy toll: building speculation, reclamation work along the coast with immense dredging operations, the deforestation of coastal mangroves, soil erosion, sea-water incursion, water pollution, and hydraulic risk are a heavy price to pay for rapid and destructive development.

Fig. 11.2 Pedro e Jorge Reinel, António de Holanda, Atlas Miller, paper n. 3, 1519 (*Source* Bibliotheque National, Paris, France)

11.1.2 The 'Death' of the Coast

Whole portions of the coast are subject to development by real estate companies speculating on the city's attractions. Melaka Gateway, the new seaport with over 240 hectares of reclaimed land, three artificial islands, and countless luxury homes, is part of the 'One Belt One Road' project that aims to re-establish Melaka as a port city along the erstwhile maritime silk road (Fig. 11.3).

'Most harbor projects will be combined with the creation of massive satellite towns' (Embong et al. 2017, p. 9) mainly earmarked for tourists. 'Construction of ports and railroads is largely financed by loans from Chinese banks. These loans will eventually have to be repaid by the Malaysian government. Majority ownership of the new ports and railway lines will stay with Chinese (mainly state owned) companies' (Embong et al. 2017, p. 11).

The Chinese plan sets out a precise geopolitical strategy aimed at transferring the port's traffic—currently converging on Singapore—to a series of ports on the eastern and western coasts of Malaysia together with the East Coast Rail Link, planned to connect them together.

In the coastal areas affected by the projects—Pantai Klebang, Pekan Klebang, Taman Kota Laksamana, Pulau Melaka, Permatang Pasir Permai, and Telok Mas—it is clear that the development started without proper planning (Yusup et al. 2016).

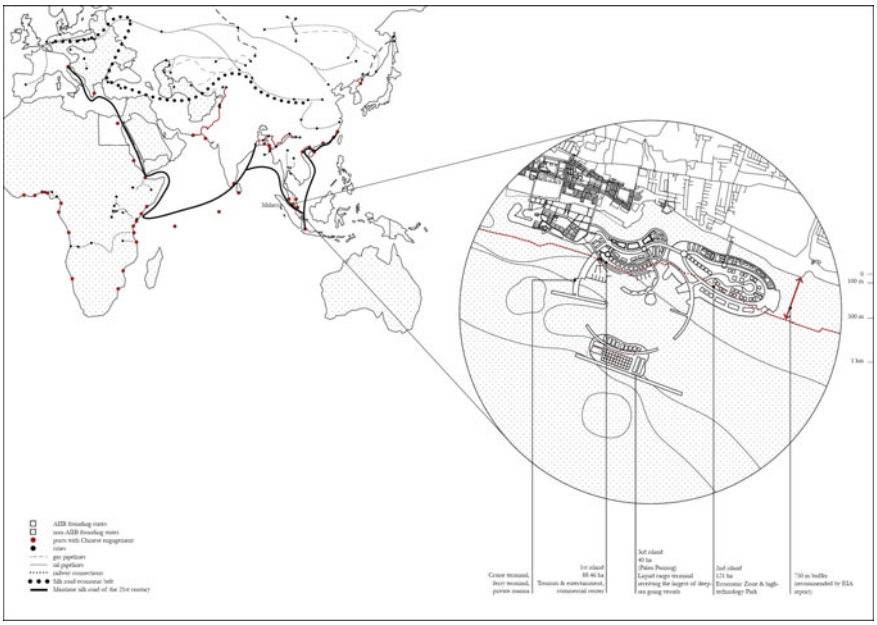

Fig. 11.3 'One belt one road' project and 'Melaka gateway' proposal. Image: student R Yan, professor L Cipriani, National University Singapore NUS, 2017. From: Cipriani L (2018) Landscapes of hope. Reclaiming Malacca. NUS, Singapore

Dimensionally inappropriate, out of scale and out of context with respect to traditional buildings, the concrete skeletons of the skyscrapers under construction loom along the coast and over the city. And not to mention the major differences between reclaimed and original land, in particular in terms of stabilization and durability. Artificial terrain can, for example, only support buildings of a certain height.

Basing ourselves upon Melaka's historical maps to retrace the reclamation projects, we will find that developments along the coastal area began in the 1920s, continued into the mid-70s in Bandar Hilir and Tranquerah and underwent significant acceleration in recent years thanks to massive Chinese investments (Fig. 11.4).

Beyond the ethereal charm engendered in the minds of the oblivious tourist, the mounds of sand in the Klebang peninsula are only a tangible testimony to an ongoing ecological war unfolding on various fronts (Fig. 11.5).

Satellite images recount the phases of the excavations. Sand is dredged from the sea, transported in large barges, and finally deposited along the coast in accordance with ill-conceived bio-engineering operations (Fig. 11.6). However, as erosion is currently already visible and underway, what is removed from the sea, the sea will sooner or later reclaim.

The coastal area viewed from below offers other clues. The water is 'mal-acqua,' literally 'bad water,' to use an oxymoron, on account of its poor quality. The recent dredging and reclamation work, as well as the absence of the mangrove forest that

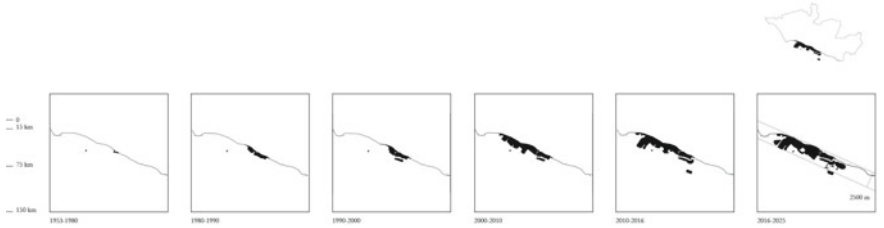

Fig. 11.4 Development of coastal areas from 1916 to 2025. Image: student R Yan, professor L Cipriani, National University Singapore NUS, 2017. From: Cipriani L (2018) Landscapes of hope. Reclaiming Malacca. NUS, Singapore

Fig. 11.5 Coastal reclamation in Melaka (Photo Satellite image, 2017)

originally ran parallel to the coastline, has accelerated phenomena of turbidity, erosion, and siltation. Moreover, the progressive disappearance of the mangroves has led to an increased influx of seawater into the water table.

But surface water quality is affected. Our investigations show that the main sources of contamination occur in the northern part of the city, as a result of industrial activities, agricultural pollutants, and slaughterhouses. In addition, wastewaters, including those from the historic centre are discharged directly into the river without treatment. To make matters worse, the tidal river running through the city is today regulated by a series of dams and locks that while ensuring navigability impede the daily exchange of its waters.

The city, crisscrossed by tourist boats instead of fishing boats, has lost its relationship with the river, the backbone of the development of the territory when people mainly moved by water, long before the advent of motorization.

Furthermore, the river has been a source of danger throughout the city's history. The great deluge of 1971, as well as previous flood events in 1930 and in 1954, means

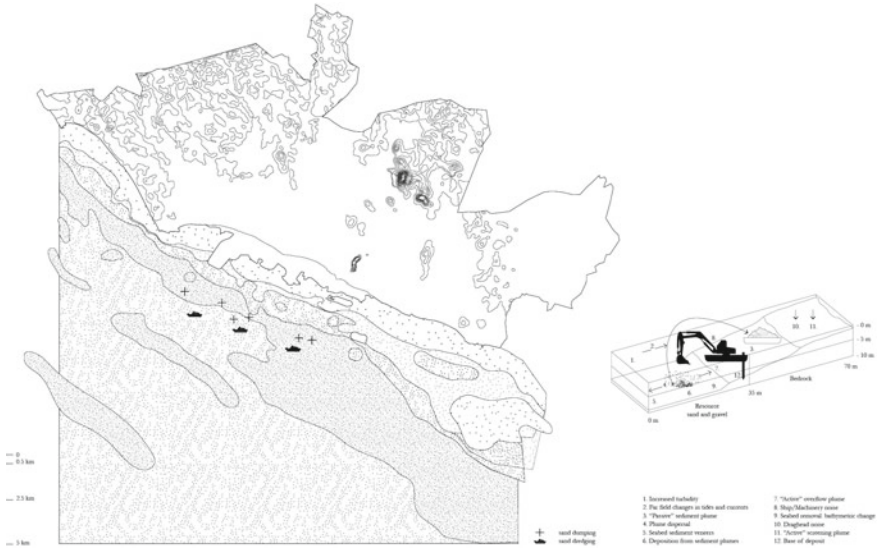

Fig. 11.6 Location and impact of sand dredging in Central Melaka District. Image: student R Yan, professor L Cipriani, National University Singapore NUS, 2017. From: Cipriani L (2018) Landscapes of hope. Reclaiming Malacca. NUS, Singapore

that sooner or later the city will have to face another major flood, perhaps worse than in the past, should extreme climatic events become more acute.

11.1.3 The 'Death' of the People

Even more worrying than these environmental aspects, is the perception that behind the changes in the built landscape racial and religious discrimination is practised against certain ethnic minorities. A war being silently fought in Melaka and Malaysia because reclamation projects undermine not only the natural landscapes but also the identities and economies of people and places.

In particular, the small community of fishermen who arrived over five centuries ago from Portugal, at the time of Portuguese colonization, today live in very straitened circumstances as the pharaonic reclamation projects have had a dramatic on their catches.

In July 2018, around 200 inhabitants in the Portuguese village in Bandar Hilir attended a mock funeral, a peaceful demonstration to protest reclamation work for the Melaka gateway project. Fishermen's bodies were symbolically laid in coffins to denote the economic collapse of the fishing industry. Participants complained about the dramatic environmental conditions of the area and the inability to fish on account

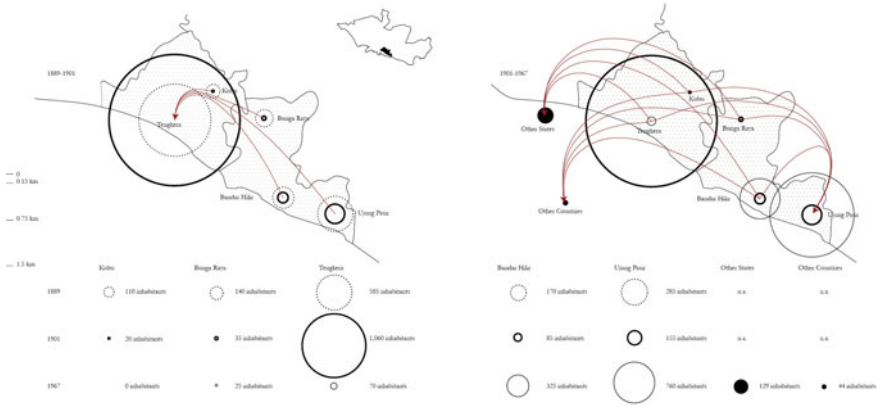

Fig. 11.7 Relocation of Eurasians of Melaka Town from 1889 to 1967. Data: KS Sandhu, P Wheatley (1983) Melaka: the transformation of a Malay capital c.1400–1980. Image: student R Yan, professor L Cipriani, National University Singapore NUS, 2017. From: Cipriani L (2018) Landscapes of hope. Reclaiming Malacca. NUS, Singapore

of the poor quality of the water and the presence of sediments along the coast that are destroying the marine ecosystem.

The Portuguese community, located to the south of the reclamation project, is what remains of the first Portuguese conquerors who arrived in Melaka in 1511. Along with the colonization of the lands, Admiral Alfonso de Albuquerque initiated a campaign of forced conversion to Catholicism, which resulted in the creation of mixed Malaysian and Portuguese communities called Kristang (Bernstein 2009).

Melaka attracted traders, missionaries, and adventurers from many parts of Asia, and the city's early multi-ethnic character was maintained, despite the vicissitudes of political change, throughout its subsequent history up until 1970, although the ethnic proportions of the indigenous communities have altered tremendously (Fig. 11.7).

'The various groups – Europeans, Chinese, Indians, and Natives – mix but do not combine. Each group holds by its own religion, its own culture and language, its own ideas and ways (…). There is a plural society, with different sections of the community living side by side, but separately, within the same political unit' (Furnivall 1948, p. 304).

The Portuguese Settlement was established in 1933 when, with a concession of 28 acres of land, the colonial government allowed the descendants of the Portuguese colonizers to gather together in a single urban core. This operation should have enabled the Portuguese descendants, mainly fishermen who resided in slums in the city of Melaka and in the localities of Tengkera, Peraya lane, Bandar Hilir, and Kampung Hilir, to overcome their condition of extreme poverty.

The government of the time accepted the creation of the Portuguese Settlement, whose plots of land were subject to annually renewable Temporary Occupation Licenses, for humanitarian reasons and after significant pressure. Although the establishment of the Portuguese village made it possible to maintain their identity

and cultural traditions, over time the community has become increasingly isolated from the rest of the territory of Melaka and continues to experience problems of overcrowding determined by a prohibition on the settlement's territorial expansion.

'Fishing is a long-established economic activity of the Eurasians in Melaka. It allows poor members of the community a limited source of livelihood' (Eng 1983, p. 279) but recent reclamation activities are preventing the community from making even a subsistence livelihood.

Martin Theseira, a Portuguese fisherman, a courageous hero of the local resistance, recounts his battle to save what remains of these places or at least to transmit a sense of responsibility to future generations for the land, sea and for what remains of the Kristang identity, as the mixed Portuguese and Asian ancestry is known: 'My family was forced to move three times. Now we have lost the sea which we depend on. We can see with our own eyes how the ecology has changed: silting, worse seabed quality, sand dumping, macro-organisms in the mud. When the mud has a grey colour it is alive, when it is chocolate black it is dead instead. It is dirt from the sea.'

In interviews with the local communities, a nostalgia emerges for the lost relationship with the sea, natural elements, and a fish-based economy, which albeit subsistence, is the basis of their livelihood.

'It's a stupid idea that such tall buildings on the seashore are blocking the sunset. The reclamation has totally destroyed the whole fishing industry. We don't need all these developments, Melaka doesn't need to be another Singapore, we are already happy with what Melaka was.'

11.2 Envisaging a New 'Life' for Melaka

This article sets out to present a series of design scenarios able to manage city-scale environmental, urban, and human complexities.

It is part and parcel of a studio aimed at studying the area in its entirety and thereby takes full account of water systems, open spaces, productive sites, and mobility networks in Melaka city and its region.

The designs' starting point is the tenet that the landscape is not only an environmental resource, but also a factor that can become an economic resource; a major driving force for an alternative development of the territory, its cities, and for its peoples.

Thanks to practical research work in the form of design projects, the course broached the question of revitalizing local economies by proposing innovative and simple ideas whereby the actual environmental and economic cycles could be replaced by a circular economy. It was with such projects in mind that we intended to seed and nurture some propitious proposals, both small and large, as a way of trigging change.

The course envisaged a design approach based on research and the knowledge of the local area ('research by design'/'design by research'), accompanied by a series of workshops aimed at drawing up alternative short- and medium-term scenarios.

Planning by means of scenarios means answering the question 'what if…?' The scenario is a tool for exploring the future in conditions of uncertainty and complexity constructed based on hypothetical reasoning.

For example, what could ensue after the completion of the Melaka project? What measures can/must be taken to mitigate water quality or protect the natural environment? What would, on the contrary, happen if land reclamation ceased and, what fate would befall such reclaimed but subsequently abandoned areas? How can we help local communities, particularly the Portuguese community, map out a different future for themselves?

By deploying scenarios for planning purposes, we propose to support decision-making processes that must tackle highly uncertain issues. The value of such scenario-assisted planning lies not so much in the answer, as in the discipline of 'creative thinking.' The objective is not to select the most probable scenario, or the one that can best meet expectations, but rather to pave the way for a flexible response to major events if or when they occur, whatever their nature.

During this phase, consideration was given to a series of possible alternatives which—we hope—public institutions and citizens will define for subsequent physical, economic, and environmental development. Landscape transformation scenarios and proposed strategies must be approached holistically.

Five main scenario themes were developed as feasible city developments: art and heritage, agriculture, energy, mobility, and water. Furthermore, all these themes can be combined with one another to give life to new economic activities and social inclusion projects, in which landscape becomes the epicentre of transformation. This article will present three scenarios which deal with the reclamation projects currently being undertaken.

11.2.1 Art and Heritage Landscapes

What do we foresee happening if the reclamation project is completed? What measures can/must be taken to preserve artistic heritage, encourage new economies, and protect the natural environment? Can we carry out intervention work on the coastline that could salvage the past and improve the future?

This scenario sets out to reconstruct the identities and economies of places commencing from past and present coastlines.

Three strategies will be adopted: first, the decentralization of tourism, which is currently concentrated in the historic centre of Melaka; second, the restoration of the historical coastline through an art-themed pedestrian and bicycle path; finally, the performance of work on the new coastline to improve the Melaka gateway's environmental conditions.

The results of the mapping process, conducted during the studio, show that the historic city originally grew up along the coastline. Thus, many old and abandoned buildings can be found marking the contours of the coastline that existed prior to being merged with the hinterland (Figs. 11.8, 11.9 and 11.10).

Fig. 11.8 Distribution of abandoned historical buildings in Melaka. Data: Google maps, 2017. Image: student Y Wu, professor L Cipriani, National University Singapore NUS, 2017. From: Cipriani L (2018) Landscapes of hope. Reclaiming Malacca. NUS, Singapore

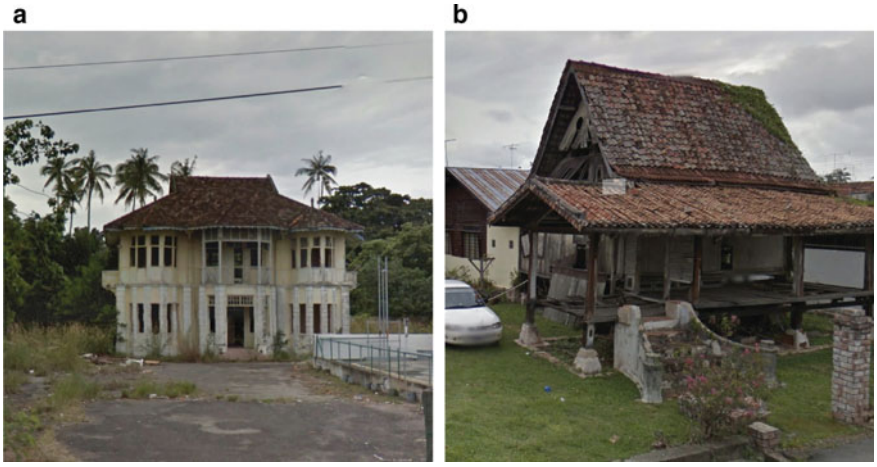

Fig. 11.9 (a) Abandoned villa near Petron Jalan Tengkera. Photo: Google maps, 2017 (b) Abandoned traditional Malay house along Jalan Tengkera. Photo: Google maps, 2017

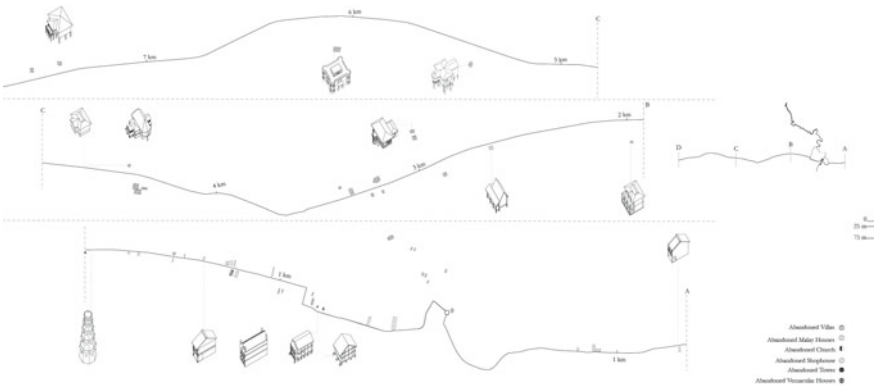

Fig. 11.10 Typologies of abandoned historical buildings in Melaka. Data: Google maps, 2017. Image: student Y Wu, professor L Cipriani, National University Singapore NUS, 2017. From: Cipriani L (2018) Landscapes of hope. Reclaiming Malacca. NUS, Singapore

Furthermore, cartographic surveys show a series of monumental trees situated along the old coastline (Fig. 11.11). Some old postcards also depict (Fig. 11.12) these coastal trees; whose importance also stems from the fact that fishermen used them to pinpoint piers when fishing out at sea. Therefore, it is quite natural that the

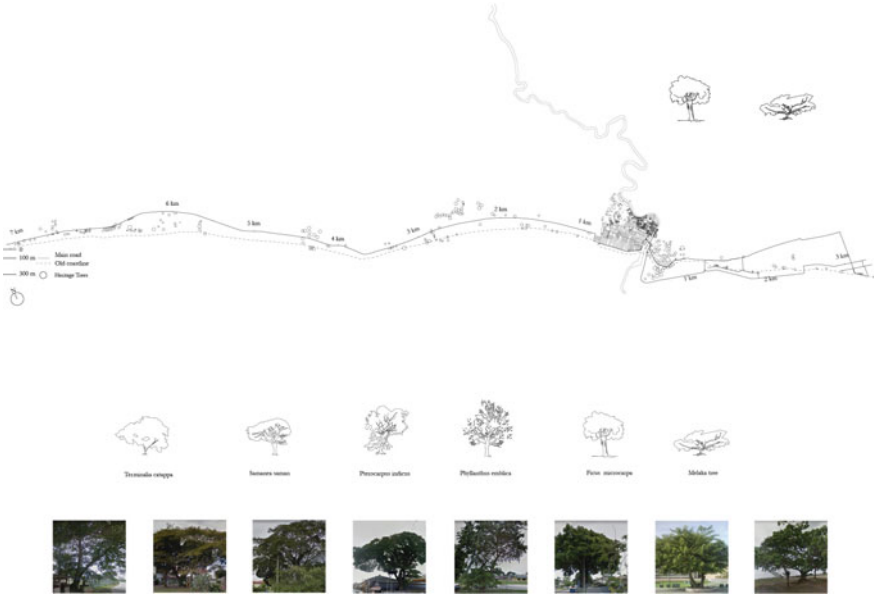

Fig. 11.11 Distribution of heritage trees in Melaka. Data: Google maps, 2017. Image: student Y Wu, professor L Cipriani, National University Singapore NUS, 2017. From: Cipriani L (2018) Landscapes of hope. Reclaiming Malacca. NUS, Singapore

Fig. 11.12 Heritage trees and piers along old coastline. Data: Historic Malacca Post Cards, 2011; Google maps, 2017

trees are now part of the region's cultural heritage, symbolizing a past with which fishermen and inhabitants can easily identify.

The new coastline (Figs. 11.13 and 11.14) the result of years of accretions, will be further and substantially altered by the 'Melaka gateway' project, as it will definitively exclude all views of the sea and remove the social and urban identities of locations.

The historic landscape was lost during the reclamation process. In order to allow past history to re-emerge and enhance future economic activities, the project set out to reclaim Melaka by positing small-scale art design works along the old and new

Fig. 11.13 The new coastline. Image: student Y Wu, professor L Cipriani, National University Singapore NUS, 2017. From: Cipriani L (2018) Landscapes of hope. Reclaiming Malacca. NUS, Singapore

Fig. 11.14 Sand dunes in the new coastline (Photo Y Wu 2017)

coastlines. More public space for art will be created thus benefitting the local craft industries and art business (Figs. 11.15 and 11.16).

Art has always been a leitmotif of Melaka. It figures in the city's murals, in its shops, in the work of street artists as well as in public planning initiatives such as the art and crafts festivals that take place every year.

Fig. 11.15 Masterplan 2025. Interventions along the old coastline. Image: student Y Wu, professor L Cipriani, National University Singapore NUS, 2017. From: Cipriani L (2018) Landscapes of hope. Reclaiming Malacca. NUS, Singapore

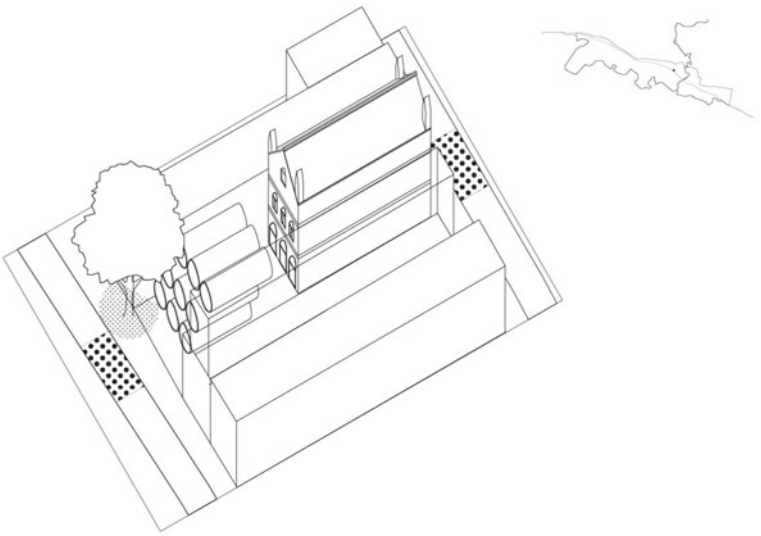

Fig. 11.16 Art intervention along the Historical Path. Image: student Y Wu, professor L Cipriani, National University Singapore NUS, 2017. From: Cipriani L (2018) Landscapes of hope. Reclaiming Malacca. NUS, Singapore

A pedestrian-cycle path based on an artistic theme is planned along the old coastline connecting the historic buildings, the monumental trees, and the Portuguese Settlement.

As the Melaka gateway project, once completed, will only exacerbate environmental issues such as the water's turbidity and erosive processes undermining soil stability, a series of ecological measures will be undertaken:- a partial restoration of the coastal mangrove forest in order to consolidate the land and improve the water quality; a series of naturalistic engineering techniques to mitigate the erosive phenomenon such as dune grass planting, dune thatching, and dune fencing.

11.2.2 Research Landscapes

What can be expected from making partial changes to the reclamation project?

As matters currently stand, the rapid reclamation process and a newly found prosperity stemming from a decade of tourism, are compromising the unique historical and cultural characteristics of the old Melaka Town. For example, the monocentric development model is concentrating the tourism industry in the town centre, while coastal reclamation causes severe phenomena of siltation and the destruction of the natural habitat.

Fig. 11.17 The process of 'Melaka Gateway' redesign along the coast. Image: student R Yan, professor L Cipriani, National University Singapore NUS, 2017. From: Cipriani L (2018) Landscapes of hope. Reclaiming Malacca. NUS, Singapore

Three strategies will be adopted: first, a modification to the still incomplete Melaka gateway project; second, the diversification of the city's economy by promoting research and university education; finally, the development of fish farming in a controlled environment.

A new reclamation plan will address the conservation of a wildlife sanctuary, respect environmental constraints, and, as regards new economic activities, propose multi-trophic aquaculture in existing areas subject to siltation (Fig. 11.17).

The Melaka project's islands will be constructed 200 metres from the coast while a bird sanctuary will be preserved thanks to a 500-metre buffer zone. Abandoned buildings extant in the reclamation areas will be repurposes as university and research centres. Intensive aquaculture production will be sited in adjoining silted up areas (Fig. 11.18). The Integrated Multi-Trophic Aquaculture System (IMTRAS) technique will be the premise for the gradual establishment of a new fishing industry (Fig. 11.19).

This technique allows waste accruing from one organism to be recycled as food for another, creating an ecosystem of various species. Farmers combine aquaculture (e.g., fish, shrimp) with inorganic extractive (e.g., seaweed) and organic extractive (e.g., shellfish) aquaculture to create balanced systems for environment remediation (bio-mitigation), economic stability (improved output, lower costs, product diversification, and risk reduction), and social acceptability (better management practices).

Fig. 11.18 The re-use of under used and vacant buildings university and research centres and intensive aquaculture production in the nearby existing siltation areas. Image: student R Yan, professor L Cipriani, National University Singapore NUS, 2017. From: Cipriani L (2018) Landscapes of hope. Reclaiming Malacca. NUS, Singapore

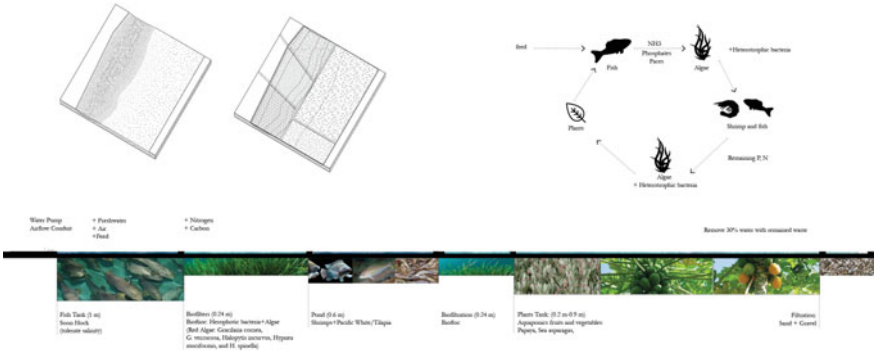

Fig. 11.19 The Integrated Multi-Trophic Aquaculture System (IMTRAS) technique will allow the progressive establishment of an advanced fishing industry. Image: student R Yan, professor L Cipriani, National University Singapore NUS, 2017. From: Cipriani L (2018) Landscapes of hope. Reclaiming Malacca. NUS, Singapore

11.2.3 Food Landscapes

What would happen if the reclamation project, as it now stands, is completed? What economic alternatives could be proposed for the city and the Portuguese Settlement?

This scenario intends to focus on food and agriculture as the city's development pillars (Fig. 11.20).

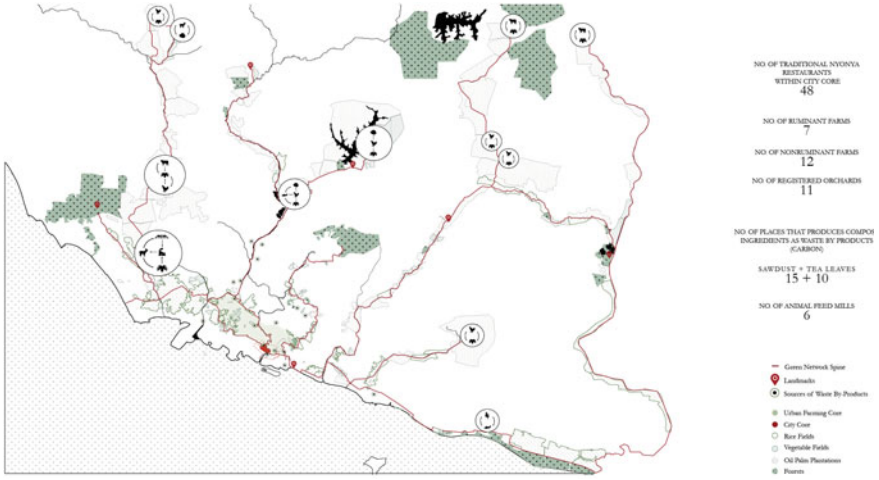

Fig. 11.20 Potential of closing biodynamic cycles in Melaka. Image: student A Sun, professor L Cipriani, National University Singapore NUS, 2017. From: Cipriani L (2018) Landscapes of hope. Reclaiming Malacca. NUS, Singapore

Thanks to the appeal of Malaya's culinary heritage, the city of Melaka has become a major culinary mecca. There is a sizable number of traditional Nyonya restaurants in the city centre (n. 48), with formal and informal markets occupying urban spaces. Every weekend Jonker Street is crowded with tourists and vendors peddling goods. Carparks are regularly transformed into night markets, with tents erected at weekends. Food tourism could play a revitalizing role in expanding and promoting the region into a variegated, food-based, culinary territory.

Strategies range from establishing a green network radiating out from the city centre to all the surrounding territory, to making improvements in the productivity of plantations in the agrarian landscape, waste recycling, and new forms of food production.

The scenario envisages a series of green pathways, or specially designed routes for urban dwellers and tourists seeking respite from the city in the countryside and interested in learning about how to prepare food and where it originates. A few simple scenic devices could be placed along these pathways to stimulate visitors' interest and guide them as they travel in the countryside.

Furthermore, some measures could further enhance these pathways: available vacant urban land could be used to cultivate crops; on-site food processing could reduce energy and costs; organic waste products from neighbouring mills and restaurants could be collected and delivered to urban farms for composting.

An analysis of existing orthophotos reveals that nearly 50% of the Melaka landscape is earmarked for oil palm plantations, 15% for rubber plantations, 16% for rice

paddy fields, 1% for coconut plantations, 5% for fruit and vegetable farming, and only 2% of the residual area has been left as natural forest.

The agrarian landscape, thus dominated by oil palm monoculture, could be improved by agroforestry techniques to increase biodiversity. Palm oil planted with the use of agroforestry systems might yield a significant increase in soil carbon stock and nutrient cycling through management practices, such as intensive pruning and mulching, while also contributing to climate change mitigation. Thus, the planting of different species is a socially, economically, and environmentally feasible alternative.

The project culminates in a design for a self-sustaining system for the Portuguese Settlement. This would valorize its culinary tradition, which, as a characterizing feature of the settlement, could enable it to become a centre for culinary tourism, and hence play a key role in improving the community's economic sustainability (Fig. 11.21).

The current development of the Melaka gateway threatens the livelihood of the Portuguese Settlement. However, the community could learn to become self-reliant and create economic opportunities for itself if several measures were taken: the promotion of intensive aquaponics and agriculture production (Fig. 11.22), subsistence backyard farming and community gardening with a close loop compost system, and water treatment for agriculture.

The food industry and tourism could become an important economic activity for the city and the Portuguese Settlement.

Fig. 11.21 The self-reliant food production system in the Portuguese Settlement. Image: student A Sun, professor L Cipriani, National University Singapore NUS, 2017. From: Cipriani L (2018) Landscapes of hope. Reclaiming Malacca. NUS, Singapore

Fig. 11.22 Intensive aquaponics production in the Portuguese Settlement. Image: student A Sun, professor L Cipriani, National University Singapore NUS, 2017. From: Cipriani L (2018) Landscapes of hope. Reclaiming Malacca. NUS, Singapore

11.3 Melaka's New 'Life'

This study aimed at proposing an integrated work method able to study various landscape and environmental themes. The result was a kaleidoscope of interrelated projects that produced a series of scenarios. Starting from these scenarios we intended to seed and cultivate ideas, both large and small, to trigger change. Art and heritage, agriculture, and water are all themes that can be combined with one another to create new economic activities and social inclusion projects where the landscape belongs to everyone.

This process simply marks a starting point for defining a possible new 'life' for Melaka, its landscape and its inhabitants which must, necessarily, entail participatory planning that will involve not only the public administrations but also all the stakeholders, at all phases of the plan.

We would therefore like to reimagine a different development for the city, in which the landscape becomes the epicentre of transformation.

We would like to recover different types of economies. An economy based on a circular rather than a linear cycle, in which waste becomes a resource.

We would like to reclaim different types of tourism. A tourism based on art and heritage, on agriculture, and on multiplicity.

We would like to recover the river as a vital element for the city, improving water quality and preparing the city for possible extreme events.

Above all, we would like to reclaim a city for everyone. A city that does not discriminate but welcomes all.

In short, we would like to reclaim what Melaka was and what it might become.

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Chapter 12
Urban Design Solutions to Cool Tropics (Case Study Approach)

Elmira Jamei and Rana Habibi

Abstract According to the United Nations, tropical cities occupy only 36% of the Earth's surface but account for one-third of the entire global population. Rapid population growth and urbanization in tropics have been associated with increased urban air temperature, thermal discomfort, energy consumption, and deteriorated public health. Increased air temperature is often accompanied by extreme heatwaves or floods. Therefore, the researches in the areas of urban heat island (UHI) phenomenon and thermal stress have received further attention within the last couple of decades and, as a result, the establishment of heat mitigation technologies has become critical. Although studies on urban climate in tropics have shown progress, however, the situation in the tropical belt remains complex and calls for further explorations. Therefore, this paper gives an overview of three main cooling techniques in tropics (shadings, wind modification, green infrastructure) through a case study approach. The case studies are located in three Malaysian cities; Malacca (heritage city), Muar, and Putrajaya (administrative capital of Malaysia). These case studies show (1) how playing with the height of the high-rise towers in CBD (in Muar) can affect the wind behavior and consequently improve or worsen the thermal comfort, (2) how different urban morphologies (geometry and aspect ratio) in heritage and contemporary sites (Malacca) can affect the air temperature and thermal comfort, (3) and finally indicate how the green infrastructure that has been incorporated into the planning of a city (Putrajaya) affect the air and surface temperature. The results of these case studies are beneficial for urban planners in better integration of urban climatic knowledge into planning practices and to establish a framework of heat mitigation methods that can be especially practical for tropics.

Keywords Microclimate · Urban planning · Urban design · UHI · Cooling strategies · Tropical cities

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12.1 Urbanization, and the Challenge of Increased Urban Air Temperature

Urbanization is described as the process of rapid land use alteration, where the population concentration becomes more in cities, due to the social and economic modernization (Wang et al. 2015). According to United Nations Department of Economic and Social Affairs (UNDESA), there has been a significant increase in the world urban population from 1950 to 2014 (Heilig 2012). Only 30% of the world population were living in cities in 1950, whereas this number was increased to 54% by the end of 2014. Furthermore, much of the global urbanization is concentrated in the developing countries and a vast area of it lies in the tropical zones (23.5 °N and 23.5°) (Roth and Lim 2017). According to Koppen–Geiger climate classification, tropical cities can be divided into three zones; Tropical Rainforest or Equatorial (Af), Tropical Monsoon (Am), and Tropical Wet and Dry or Savannah (Aw) (Rubel and Kottek 2010).

The impact of rapid population growth and urban development on urban heat island (UHI) effect has been well documented in the literature. Urban heat island is a term used to explain a phenomenon in which the air and surface temperature becomes higher than the one in the surrounding rural areas. The global climate change and heat island effect have led to heat-related mortality and morbidity rates, particularly in highly dense and compact developments in tropical and subtropical cities of Southeast Asia (Akbari et al. 2016).

The main feature that is common among all diverse tropical zones is its high solar altitude and the migration of low pressure and therefore seasonal rains. Figure 12.1 shows that the main area of tropical belt which has to be under control is the Inter Tropical Convergence. In 1981, the world meteorological organization (WMO) for the first time has emphasized on the urgent need to conduct research on tropical

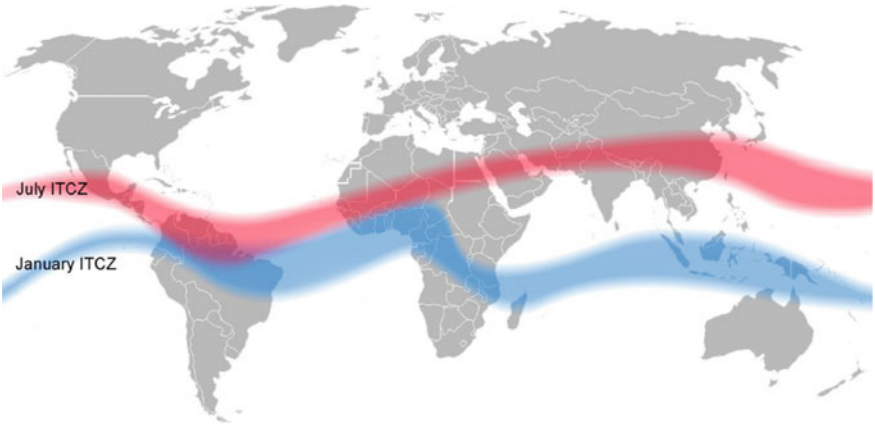

Fig. 12.1 Global "tropical" belt (tropics and subtropics) (Renganathan Giridharan and Emmanuel 2018)

urban climate. Since then scholars carried out numbers of studies to review the urban climate in tropics (Adebayo 1990). Before 2007, only 20% of urban climate studies were conducted in tropical cities, but today this percentage has been increased significantly and the number of publications on this topic has reached 35 per year.

Despite the high importance of heat mitigation in tropical cities and high number of researches in this area, there is still this concern that urban climate in tropics has not been well documented (Gazal et al. 2008). Furthermore, the studies have shown that there is a significant gap between the urban climate knowledge and planning practices (Ng et al. 2015). These issues are more critical in tropics where UHI worsens the global climate change and brings negative impacts on energy consumption, public health, anthropogenic heat, and CO_2 emission.

Looking to the intensity of UHI across tropical cities and its impacts on public health, and outdoor thermal comfort, there has been an urgent need to identify the most effective mitigation and adaptation methods that can enable governments and stakeholders to integrate urban climatology knowledge into planning practices and prevent catastrophic heat-related events. Scholars have suggested diverse strategies to reduce the urban air temperature; each strategy is differently affecting the variables that affect UHI. Three promising heat mitigation methods that can significantly reduce the UHII and thermal discomfort in tropics are discussed through a case study approach. The case studies are located in three Malaysian cities; Malacca (heritage city), Muar, and Putrajaya (administrative capital of Malaysia). These case studies show (1) how playing with the height of the high-rise towers in CBD (in Muar) can affect the wind behavior and consequently improve or worsen the thermal comfort, (2) how different urban morphologies (geometry and aspect ratio) in heritage and contemporary sites (Malacca) can affect the air temperature and thermal comfort, (3) and finally indicate how the green infrastructure that has been incorporated into the planning of a city (Putrajaya) affect the air and surface temperature. The results of these case studies are beneficial for urban planners in better integration of urban climatic knowledge into planning practices and to establish a framework of heat mitigation methods that can be especially practical for tropics.

12.2 Urban Design Solutions to Cool Tropics (Shading)

Shading is known as one of the most effective strategies to reduce the heat stress in multifaceted outdoor settings in tropics (Emmanuel et al. 2007), as it blocks the direct solar radiation. Therefore, several scholars have focused on the effect of shading on thermal comfort. In some studies aspect ratio was used to evaluate the shading level (Johansson and Emmanuel 2006; Shashua-Bar et al. 2010), whereas, in some other studies, sky view factor (SVF) was used to assess the comfort level (Dimoudi and Nikolopoulou 2003; Giridharan et al. 2005). SVF is the percentage of free sky at specific locations and its value varies from 0 to 1, representing obstructed and free spaces respectively (Oke 1988). All these studies showed that high level of shading leads to lower level of mean radiant temperatures in outdoor spaces. For example, in

one study five different types of bus shelters (which are semi-outdoor spaces) were studied and compared in regard to their SVF and the level of comfort that they provide (Lin et al. 2006). The results of this study showed the worst thermal conditions in the shelters with highest SVFs.

Studies conducted in dense urban settings, indicated that the courtyard urban blocks should be linked to street networks at ground level. Additionally, windows and walls have to be shaded with permanent ventilation openings (Qaid et al. 2016). In another study, a significant reduction in the energy consumption of buildings was first linked to the shade provided by the trees and second to the green plot ratio (Chen et al. 2012). However, careful spatial distribution of the vegetation was found critical in further reduction of UHII. In similar studies, the compact urban morphology (consists of standalone skyscrapers linked by sky bridges, towers on podium and urban blocks with multiple courtyards) were linked to high level of shading in outdoor urban environments (Lau et al. 2019; Yang et al. 2013). A study also found that the best outdoor thermal condition can be achieved through the aspect ratio between 2 to 3.5 (Sharmin et al. 2015). The concept of shadow umbrella was also introduced for the very first time by Emmanuel (Rohinton Emmanuel and Steemers 2018), which aims in cooling the public spaces of tropical cities. In this concept, the built-up massing self-shade through optimal positioning in the city. In the following section, the impact of urban form (urban geometry and aspect ratio) and shading on air temperature and UHII is discussed in Malacca city, a UNESCO world heritage site located in Malaysia.

12.3 Malacca Case Study

According to the Department of Statistics in Malaysia, the country is undergoing rapid urbanization and urban growth, as the percentage of people who live in urban areas has increased from 27% in 1970 to 62% in 2000 (Department of Statistics Malaysia. The first study in Malaysia which demonstrated cities are warmer than surrounding rural areas was conducted by Sham in 197 (Sani 1972). His finding was then supported by the other researchers who found the core of the city centers are warmer than the surrounding rural areas (Jamaluddin and Sham 1987; Kubota and Ossen 2009).

Malacca city is the capital of Malacca state and is located in the south-west part of Peninsula Malaysia (2.29 ◦C N 102.30◦E). The city is located approximately 147 km from Kuala Lumpur, facing the Straits of Malacca on the west (Fig. 12.1). Malacca is also known as the third smallest state in Peninsular Malaysia but has the second highest population density. In 1975, only one-quarter of the state population (457, 300) lived in urban areas, but more than 821,110 people live in urban areas nowadays (El-Shakhs 1972). The city was also listed as the UNESCO world heritage site in 2008. The city is also known as a thriving port for international trade. Today, the cityscape has been drastically changed.

Malacca has hot and humid climate. It has a uniform air temperature during the year with an average maximum of 27.5 ◦C, average minimum of 25 ◦C, and average humidity of 62.6%. Winds are generally light and variable with speeds averaging around 0 m/s to 7.5 m/s.

Today, there are two types of urban morphologies in Malacca; the traditional heritage zone which is mainly characterized by two-storey shop houses, and the newly developed areas where the tall buildings and car parks occupy the majority of cityscapes. Shop houses are usually 6 m to 7 m wide and 30 m deep.

The heritage core zone is compact in form. The height of shop houses is less than two to three storeys, and street spaces are partially shaded during the day. Clay tile and laterite are the construction materials used in the shop houses for the roofs and walls, respectively. Pavements are mainly from asphalt, concrete, and tile. Only few spaces are dedicated to natural landscapes and greenery.

Strict guidelines have been imposed on building heights for the new developments in heritage zone. However, there is no such control in the contemporary built-up areas. Therefore, this case study aims to examine the role of urban geometry and shading on cooling the air temperature.

Figure 12.2 shows a comparison between a typical urban area in heritage site and in contemporary urban area.

Based on LCZ classification of Stewart and Oke, the heritage site corresponds to LCZ4 (compact low-rise), while the contemporary site classifies as LCZ3 (compact midrise).

As Fig. 12.2 illustrates, the townscape in contemporary site is different from the one in heritage site which is dominated by traditional shop houses. The contemporary

Fig. 12.2 Comparison between urban morphology and aspect ratios in heritage zone (Top) and Contemporary urban site (Bottom) (Jamei et al. 2017)

urban site is dispersed in form and is located in the southern part of the heritage core zone. In contrast to the homogeneous shop houses in the heritage core zone, the contemporary urban environment is composed of buildings with various heights and constructed with diverse materials.

The three-dimensional microclimatic modeling system ENVI-met (version 3.1) was used to simulate the summertime air temperature variation in a typical urban setting of a heritage site and contemporary urban area. On-site field measurements were performed from 0900 to 2100 h local time on 10 July 2011, under clear sky conditions. July was selected as the time for simulation, because the south-west monsoon brings only light winds and thus air temperature will be only minimally influenced by wind. Wind speed records from anemometers did not show a significant difference between the two study areas. Therefore, the simulations were conducted with 3 m/s wind speed from the south-west direction.

The relationship between temperature variation and urban form was investigated by quantifying the aspect ratio (the ratio of the canyon height [H] to canyon width [W]). The aspect ratio was found to have a considerable influence on air temperature distribution in the urban areas.

The simulation outputs showed that the heritage site, with its higher aspect ratio, had lower daytime temperatures than those recorded for contemporary urban areas, which had lower aspect ratios; although the latter areas had cooler nights. The lower daytime and higher nighttime air temperatures recorded in the heritage site revealed a clear relationship between air temperature and aspect ratio. The deep canyons in heritage site helped to reduce the daytime air temperatures by providing further level of shading. The study also found that the duration, time of day, and spatial distribution of maximum UHI within an urban canyon is strongly affected by shading. Therefore, the level of shading provided by urban design is an important factor in creating thermally comfortable outdoor environments and has to be taken into account in designing open public spaces in tropics.

12.4 Urban Design Solutions to Cool Tropics (Wind Modification)

The second important technique in cooling a tropical city is enhancing the wind in outdoor settings. One of the practical methods in quantifying the air ventilation in outdoor environments is the concept of "building frontal area index." This index enables planners to identify the main wind corridors within outdoor urban environments (Edussuriya et al. 2011). This value is calculated as the total area of building facets projected to plane normal facing the particular wind direction (and independent of the angle of the building facets), divided by the plane area (Raupach 1992).

The wind speed and velocity in urban environments depend on several factors, such as the percentage of built-up area in a specific site, the distance between the built-up areas, and height of the built-up areas (Yuan and Ng 2012). A study in Muar,

Malaysia has shown that the diverse building height, massing types, and scattering of tall buildings provide higher level of ventilation at pedestrian level. Furthermore, removal of random buildings in an urban setting would not improve the overall ventilation at pedestrian level (Rajagopalan et al. 2014). However, it will assist in further heat dissipation at higher levels.

Another method to enhance cooling in tropics is combination approach in which few mitigation strategies are used together. For example, the combination method of ventilation and shading can be achieved through correct modifications and design of street geometry and orientation. In regard to the street orientation, Emmanuel has shown that in tropics thermal condition is worse in east-west oriented streets compared to north-south oriented streets. In regard to urban form, traditional urban morphology which consists of diverse geometries, shapes, and setbacks provide a better thermal condition compared to pre-planned urban areas which are characterized by equal building heights, distance, and plots (Sharmin et al. 2015).

It is worthwhile mentioning that a heat mitigation technique that can be constructive to one city might be harmful for the other city. For example, ventilation might be a constructive tool to cool a conventional tropical city, however, this might not be the case for a polluted tropical city. Additionally, it has to be kept in mind that citywide cooling through one method is not feasible, due to the different nature of building types and occupancies (Miller et al. 2015). Furthermore, the per capita energy consumption that influences the magnitude of latent heat fluxes has to be taken into account in recommending the effective heat mitigation methods (Quah and Roth 2012). Because this process increases the anthropogenic heat in urban areas and has significant impacts on both daytime and nighttime UHII. The following section will show how the urban form and modification of the height of tall buildings influence the wind behavior in the CBD of Muar city.

12.5 Muar Case Study

The city of Muar is located in the south-west part of Peninsular Malaysia (230 N 102340E). Similar to the other tropical cities, Muar's climate is characterized by high air temperatures, humidity, and rainfall throughout the year. Although the city has south-west and north-east monsoons, but the air temperature does not vary much throughout the year. In fact, Malaysian cities, are less influenced by the north-east monsoons due to the blockage of winds by Titiwangsa Mountains.

Muar has been under rapid population and urban growth in recent years and as a result the city center has faced hectic expansion. The average building heights in the city center has been changed from 3 storeys to 20 storeys. Therefore, the wind flow and velocity has been significantly blocked by the high-rise buildings in the city center. Currently, the city center is a combination of pre-war colonial and medium-rise buildings that are positioned along the river. Some of the tall buildings have been placed on top of the existing buildings. These newly built buildings have been

developed without taking urban climate knowledge into account and they have been randomly placed on top of the other buildings.

In the meantime, the average daytime air temperature is recorded higher in the city center compared to the rural areas by 1.2 °C. The increased urban air temperature has resulted in thermal discomfort for the urban dwellers, increased energy consumption for cooling, and further reliance on air conditioners. Despite the negative consequences of rapid and hectic urban developments in city center on UHII, no research has investigated the role of high-rise building positioning in promoting the wind velocity.

In this case study, IES (a numerical modeling system) was used to model the wind behavior in the city center and quantify the cooling impact of proposed scenarios. Figure 12.3 illustrates the modeled city center in IES. As Fig. 12.3 shows, the site consists of four rows and three main canyons with asymmetrical forms. Blocks A and B are dominated by buildings with more than six storeys. The densest area in the city center is depicted by Block A4. Block B4 and B3 consist of open spaces and low to medium-rise buildings. The model has been also verified with field measurements and the calculated R^2 value was 0.96, which shows a good agreement between the measured and simulated air temperature.

Four different scenarios were proposed to examine whether different positioning of high-rise buildings can enhance the wind velocity. Figure 12.4 shows the schematic layout of each proposed scenario which was modeled in IES.

In Geometric variation 1, the building height in Block 4 was decreased to the height of the majority of the existing medium-rise buildings in the city center (3–4 storeys). In this scenario, the assumption is to remove the newly built tall buildings located on the windward side. The simulation results showed no significant alteration in the wind velocity. However, the reduction in the building height helped in providing natural ventilation for all the buildings. To maximize the wind velocity, the tall buildings should be positioned in the windward sides.

In geometric variation 2, the tall buildings were cut from the middle of their heights and an opening equivalent to a single storey building was created. This scenario is also known as permeable design scenario. The findings of the simulation showed that tall buildings increase the wind velocity at street level, but the permeable design

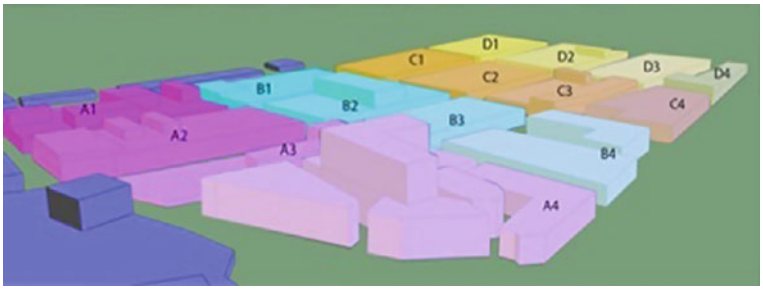

Fig. 12.3 The location of each block in City Centre modeled in IES

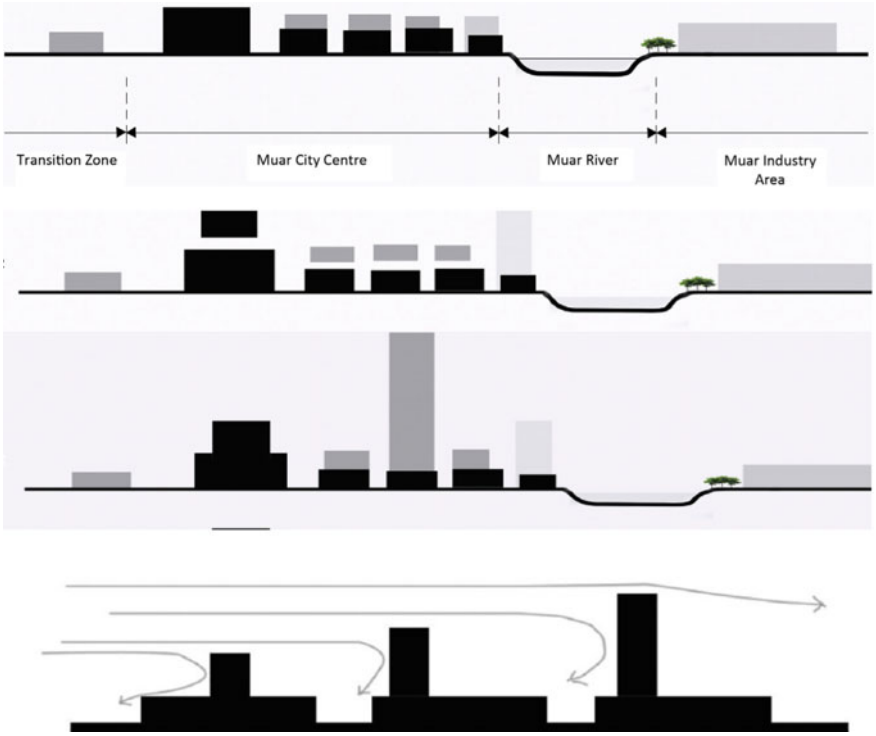

Fig. 12.4 Schematic section of the proposed scenarios; From top to bottom, Geometric variation 1 (reducing the height of high-rise buildings), Geometric variation 2 (open up high-rise buildings by one story), Geometric variation 3 (adding off scale skyscrapers), and Geometric variation 4 (step up configuration) (Rajagopalan et al. 2014)

guides the wind toward the opening, instead of increasing it at pedestrian level. The results also showed that the wind speed at the opened-up area increased due to the venturi effect. However, the wind is directed upwards without passing to the street.

In geometric scenario 3, the future urban growth in the city center is modeled by increasing the number of tall buildings. The simulation results show that strong winds can be created in front of the immediate surroundings of the tall buildings at higher levels, but not necessarily at pedestrian level.

In the final proposed scenario, Geometric variation 4, step up configuration (the height of the upwind building is less than the height of the downwind building) is modeled. The results of the simulations showed that in this scenario the wind can reach the leeward side of each building. This study concluded that in the planning and design of urban blocks, areas with low wind velocity could be shaded and covered with trees. As a result, thermal discomfort in less ventilated urban areas will be compensated by the shading and evapotranspiration of green spaces especially in tropical climate.

12.6 Urban Design Solutions to Cool Tropics (Green Infrastructure and Evapotranspiration)

The other important heat mitigation method in cooling a tropical city is incorporating green infrastructure in urban design. Although there has been a large body of literature on the cooling benefits of green infrastructures in cities (Morau et al. 2012; Wong et al. 2011), but the evidences on the impact of GI on the thermal condition at pedestrian level is lacking. A study in Hong Kong showed that extensive and intensive green roofs reduced the pedestrian level air temperature by 0.7 to 1.7 °C respectively (Peng and Jim 2013). However, the cooling benefit was only extended to the immediate surrounding of the GI, particularly in compact and dense urban developments.

The cooling benefits of GI depend on several factors such as vegetation type, coverage, spatial coverage and distribution, leaf area index, and water availability. In Reunion Island, a green roof with 120 mm of thickness decreased the air temperature by 6 °C, at the bottom of the drainage layer. Whereas, porous media which has a higher moisture storage capacity, led to a high thermal mass and therefore created fluxes downwards to warm indoor air and as a result increased cooling load (Morau et al. 2012).

Only few studies have examined the impact of diverse vegetation types on cooling urban environments. In 2015, a comprehensive dataset of the most practical GI for topics has been published. This dataset indicates that the thick foliages reduce the cooling benefits of the plant, due to the evapotranspiration from reaching downwards. Therefore, careful design details have to be taken into account in integration of GI into the planning of tropical cities.

The cooling benefits of trees, whether in a form of individual tree or groups of trees has been well-established in the literature. A study in Campinas, Brazil showed that under a tree canopy in a tropical city, the air temperature drops up to 5 °C and therefore outdoor thermal comfort is significantly improved compared to unshaded areas (De Abreu-Harbich et al. 2015).

A similar study in an urban park in Singapore indicated that the air temperature inside the park is on average 1.3 °C lower than the areas closer to the park (Ca et al. 1998). Similar findings were achieved in Taipei, where the air temperature was found on average 0.8 °C lower than the surrounding built-up areas during hot summer days (Chang et al. 2007).

The variation in the air temperature reduction caused by trees and parks can be linked to several factors such as the tree physiognomy (height, foliage, shape, leaf area index, stomata resistance, and crown permeability) (De Abreu-Harbich et al. 2015). Furthermore, the physical features and structure of the trees such as trunk, size and shape of the leaves, and the available water for irrigation affect their cooling capacity. To maximize the cooling effect of trees in tropics, monsoonal dry forest species are strongly recommended, as they are the most tolerant plant types to the heat (Kjelgren et al. 2011).

Green roofs are also known as one of the most practical and effective tools to reduce the air temperature at boundary layer. However, their effectiveness in

cooling the pedestrian level temperature is still under researches and investigations. It has been well-established that the extensive roofs can reduce the pedestrian level air temperature more than intensive green roofs, and this cooling effect is largely depending on the land coverage of the surrounding area. For example, the impact of extensive green roofs is more tangible in low-rise sites compared to high-rise sites (Peng and Jim 2013). Similar to the green roofs, the cooling benefit of urban parks also largely depend on the site and the surrounding context. Both large and small urban parks are found effective in cooling the air temperature. However the intensity and degree of the cooling impact and the nature of the cooling vary largely in every site and context (Giridharan et al. 2008; Jamei et al. 2016). For example, a study found that the cooling benefit of the parks can reach 300 meters from each side of the park. Additionally, the small green pockets of urban parks (with 1000^2 m area) located at equivalent intervals can provide higher level of cooling compared to standalone single large parks (Ng et al. 2012).

Application of green walls is also another method in reducing the air temperature as well the air pollution in cities. A study in Singapore found that a green wall can lead to 6 to 10 °C surface temperature reduction compared to a concrete wall (Wong et al. 2010). This variation in the temperature reduction depends on the type of the green wall. Only few studies have examined the cooling benefits of green or living walls on pedestrian level air temperature. More detailed analysis of diverse types of green and living walls, their drawbacks, benefits, and applications can be found in the work of (Charoenkit and Yiemwattana 2016) and a very comprehensive database of different plants that can grow on urban vertical surfaces can be found in the work of (Pandey et al. 2015).

Finally, the concept of "a City in a garden" which was introduced in nineteenth century in Britain is another urban planning technique to cool the cities. Based on this concept the city will be surrounded and filled with numerous green belts and water bodies as well as green pockets and green corridors. Some of the most well-known tropical case studies that followed this technique are Putrajaya in Malaysia (Moser 2010) and Maringáin Brazil (Macedo 2011). In Putrajaya, the city cooled down by 0.5 °C due to the application of "a City in a garden" concept. The air temperature reduced by 0.04 to 0.02 °C per one Km^2 of GI and water bodies respectively (Morris et al. 2016).

Finally, it's worthwhile mentioning that the application of "a City in a garden" might not be feasible for all the tropical cities, where there is a critical shortage of land for construction. Additionally, further investigations and deeper studies have to be undertaken to achieve the optimum size of such city for a given population density in order to achieve the most thermally comfortable outdoor environments.

12.7 Putrajaya Case Study

Putrajaya is the administrative capital of Malaysia and it is a planned city based on the concept of "intelligent city in the garden." The city is situated in Klang Valley,

between Kuala Lumpur city and its international airport (2° 55′ N and longitude 101° 42′ E). The establishment and development of this project started in 1993, and it was known as one of the largest projects on the green field site in Malaysia. The main characteristic of the city is the integration and combination of diverse green spaces, water bodies, and open spaces (form one-third of the city's area) that act as the lung of the city. An artificial lake has divided the city into core and peripheral areas. The main boulevard which is designed as the ceremonial street for national events and parades is extended from north-east to south-west and intersects five precincts of the core area (1,2,3,4, and 4) (Fig. 12.5).

Similar to the other tropical cities, Putrajaya's weather is hot and humid, with the average air temperature of 25 °C and humidity of 70%. Wind speed varies from 0 to 7.5 m/s.

Given the high percentage of green spaces in this city, this case study aims to explore the surface temperature and the UHI behavior. To address this objective, field

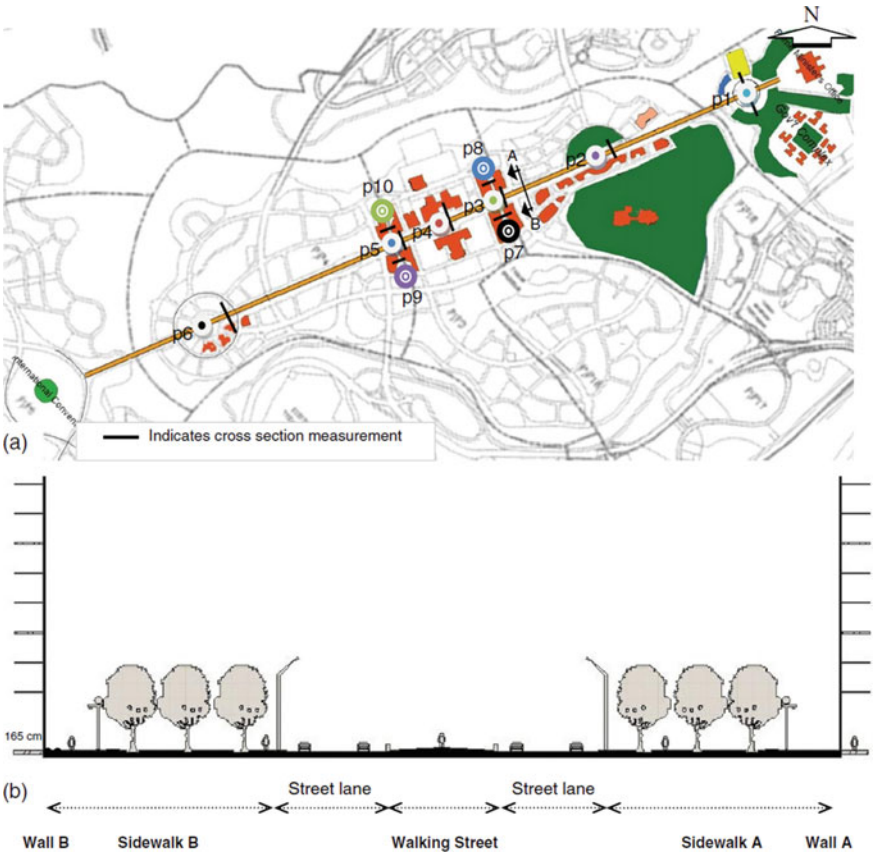

Fig. 12.5 Locations of measurement sites along Putrajaya Boulevard and perpendicular streets. (b) Typical Putrajaya Boulevard cross-section (A–B) (Ahmed et al. 2015)

measurements were conducted for surface, and air temperature, solar radiation, and wind velocity for 3 consecutive days (14–16 July 2012), under clear sky condition. The measurement points were mainly located in different spots in the main boulevard (e.g., near green spaces, on the walls with different materials, and also on pavements).

The field measurements showed that the lowest surface temperature (23 °C) is recorded at 8:00 am at Wall A of points 2 and 4 (which has a high albedo material), and located near dense canopy trees, shrubs, and green spaces. Points 2 and 4 are located in the sidewalks which are covered with green coverage, and therefore the absorbed radiation is radiated back to the atmosphere at nighttime. The measurements also revealed that there is no significant difference between the air temperature recorded on top of the grass areas of the boulevard and the benchmark reference point situated in rural area at nighttime. However, the grass area in the boulevard was 1 °C cooler during daytime. Furthermore, it was found that the shade from buildings is more beneficial on reducing the surface temperature compared to the shade caused by tree foliage. The study also indicated that to maximize the cooling effect, the combination approach which emphasizes on the integration of trees, shrubs, green areas, and shade from buildings has to be promoted. This approach can lead to 3–5 °C surface temperature reduction in Putrajaya.

Despite being a planned city and incorporating the concept of city in a garden, Putrajaya exhibited high air temperatures during the day. The study concluded that the increased air temperature in Putrajaya is mainly related to the high presence of high albedo pavement materials which were used in the exposed area, and lack of shading from the buildings. The findings of this case study were in line with the results of (Akbari et al. 2001; Santamouris 2007; Taha 1997; Wong and Chen 2008).

12.8 Conclusion

Climate change and increased urban air temperature has led to more frequent heat-waves in the already warming tropics. The main increase in the air temperature is concentrated in cities. Furthermore, public health, especially in developing tropical cities, are significantly influenced by urban warming. Despite the importance of urban climate in tropics, heat mitigation strategies have not thoroughly incorporated into planning and design practices To fill this gap, this paper presents an overview of different heat mitigation techniques (using three different case studies and desktop review) that have been implemented in tropics and contributed to reducing UHII and improving outdoor pedestrian thermal comfort.

The case studies indicated the important role of shading, wind velocity, and green infrastructure in cooling the air temperature in tropics. The first case study highlighted the important role of H/W ratio of canyons in climate-sensitive urban design, because of its effects on daytime shading and nighttime thermal comfort. The second case study demonstrated how thoughtful design of tall buildings and their heights can positively affect the wind velocity at pedestrian level. Finally, the third case study

confirmed the findings of the previous studies on how GI contribute to reduced air and surface temperature.

This article showed that cities have to be planned carefully prior to their full development, in order to prevent urban overdevelopment from negatively affecting the air temperature and public health. It was also shown that planning decisions should be supported by quantitative evidences.

In sum, the review of the previous papers showed that the most effective heat mitigation methods for tropics are combined approaches where the combination of several strategies used to reduce the air/surface temperature. These types of strategies are worth exploring and are fully aligned with sustainable development visions and missions. Future works should focus on prioritizing cooling strategies in different local climate zone (LCZ) systems in tropical cities.

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Chapter 13
Managing Waste in the Smart City of Singapore

Caroline Wong, Jacob Wood, and Swathi Paturi

Abstract This study seeks to analyse the effectiveness of waste management in a highly developed, smart city like Singapore. It reviews the various approaches undertaken by the Singapore Government to align its waste management efforts with the Sustainable Development Goals (SDGs) in the UN 2030 Agenda. It also examines the contributions of other important stakeholders such as businesses and start-ups in the private sector, the so-called 'informal sector' and the wider community in managing waste. This research uses a qualitative methodology, through an integrative review of the literature, which offers insights into the challenges of waste management and in particular Singapore's efforts in plastic waste management given its Smart Nation agenda. The findings and analysis reveal that while Singapore has taken some important first steps in raising awareness about the need to implement plastic and e-waste management practises, it is still very much a country in transition in the area of plastic waste management. The most pressing issue is about shifting consumption behaviour patterns in a manner that sees individual consumers becoming more active participants in the circular economy highlighting the significance of cultural norms in shaping household consumption behaviours.

Keywords Waste management · Plastic waste · Singapore government · Sustainable development goals (SDGs)

13.1 Introduction

Managing solid waste is a universal issue affecting people all over the world. A total of 2.01 billion tonnes of municipal solid waste was reported globally in 2018, with at least 33% of that not managed in an environmentally safe manner

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(Kaza et al. 2018). In 2016, the East Asia and Pacific regions generated 468 million tonnes of waste, at an average rate of 0.56 kgs per person per day, with about 46% of this being disposed of in landfills (Kaza et al. 2018). The disposal of waste in this manner is considered the least desired waste management alternative from an environmental point of view (Belboom et al. 2013; Eriksson et al. 2005; Yay A.S. 2015; Fiorentino et al. 2005; Tulokhonova and Ulanova 2013). As global waste is expected to grow to 3.40 billion tonnes by 2050 (Kaza et al. 2018), this has become a major global concern for both governments and local communities. It is therefore apt that the 2018 World Habitat Day focused on the issue of sustainable consumption and effective municipal solid waste management practices (Urban October, n.d.). Such a focus is supported by recent UN-Habitat findings that note some 99% of purchased items are discarded within six months (United Nations News, 1 October 2018). Given such findings there has been a call for attitudinal change among society, to minimize waste and increase the amount of recycling, upcycling and reusing of materials as well as more effective solid waste planning. Progress in these areas will not only improve the current state of solid waste management but also help to save money through the development of 'Waste-Wise Cities' (UrbanOctober, n.d.). Like many urban cities, Singapore, also produces a significant amount of waste, with some 7.7 million tonnes of waste recorded in 2018 (National Environment Agency 2018). How does Singapore, a highly developed smart nation-state, manage its waste challenge so that it addresses its own waste management and sustainable development goals (SDGs)? This study seeks to provide answers to this pertinent question.

13.2 Methodology

This research uses a qualitative methodology, through an integrative review of the literature, which offers insights into the challenges of waste management and in particular Singapore's efforts in plastic waste management given its Smart Nation agenda. The literature review is drawn from primary data many of which are sources from relevant government bodies, the United Nations and media coverage of the various initiatives and policies implemented. The secondary data is drawn from discipline-specific, peer-reviewed journals such as Environment International, Waste Management and the Journal of Cleaner Production. The following literature review examines the global challenges of waste management followed by an analysis of Singapore's waste management efforts, taking into consideration various stakeholders such as the informal sector, SMEs and start-ups, and the wider community in managing waste. It also reviews the use of Internet of Things (IoT) in waste management and the extent to which these technologies will be utilized effectively in a Singaporean context.

13.3 Waste Management and Global Challenges

Indiscriminate solid waste disposal and treatment as well as a lack of capacity at landfill sites has contributed to an environmental pollution across many urban areas (Rahmasary et al. 2019). As such, the issues of unsustainable rates of consumption and waste generation in cities form an integral part of the Sustainable Development Goals 2030 Agenda (United Nations 2019). Ineffective waste management systems have also had considerable negative economic and social impacts (Lohri et al. 2014). Several decades of strong economic growth has meant that more needs to be done across all levels of society to address the remnants of poor management practices and a lack of proper recycling. More specifically, the improper management of municipal solid waste has exacerbated climate change concerns causing environmental and human health damage, biodiversity loss and soil erosion (Cleary 2009; Hoornweg and Bhada-Tata 2012). For example, in 2016 waste generated an estimated 1.6 billion tonnes of carbon dioxide greenhouse gas emissions, some 5% of the total level of global emissions, a figure that left unchecked is expected to rise to 2.6 billion tonnes by 2050 (Kaza et al. 2018). Also of particular concern are the threats posed by plastic waste. Plastic waste alone contributes to 12% of total waste generated each year and is the biggest contributor of waste in the East Asia and Pacific regions with 57 million tonnes created (Kaza et al. 2018). Not only does plastic waste degrade natural environments, it can also disrupt food chains (United States NOAA, n.d.). A key challenge in the battle against plastic waste is the fact that many developed economies, including many in Europe, simply lack the capabilities to effectively process the vast quantities of waste that are produced each year, with Europe exporting one-sixth of its plastic waste largely to Asia in 2017 (*The Economist* 2018). In an attempt to address these concerns, the European Union has adopted a set of measures that support the implementation of a circular economy (European Union 2018). To date, these efforts have failed to gain sufficient widespread support across communities in the region.

A key factor impacting the implementation of effective urban waste management practices is cost. Despite the important need to minimize the amount of waste initially produced, there are significant financial demands placed on local, regional and national governments. In low-income economies, the management of waste can be the single highest budget item, accounting for nearly 20% of municipal budgets for many local government administrations (Kaza et al. 2018). Moreover, for middle-income countries, solid waste management typically makes up approximately 10% of municipal budgets, while it accounts for about 4% in high-income countries (Kaza et al. 2018). Despite the significant costs associated with its management, one must also consider the coverage of the collection itself. At a national level, the average coverage of waste collection for the East Asia/Pacific region is approximately 71% (Kaza et al. 2018). However, rates do differ across the rural/urban divide, with collection rates of about 77% seen in urban areas, while only 45% of total waste products are collected in rural communities (Kaza et al. 2018). These figures are significantly higher in wealthier developed economies such as Singapore, Hong Kong SAR, China,

Japan and Korea where almost 100% of municipal waste is collected (Kaza et al. 2018). Despite Singapore's collection capabilities, the question remains if more could be done to better understand waste generation and management.

13.4 Waste Management in Singapore

Singapore produced approximately 7.7 million tonnes of solid waste in 2018 of which some 4.72 million tonnes of waste was recycled (National Environmental Agency 2018). This is a significant amount of waste for a very small city like Singapore (Ong et al. 2019). The table below outlines the waste and recycling rate of Singapore in 2018.

Singapore's export-orientated industrialization policy and strong domestic demand for goods have led to significant increases in total waste output. In conjunction with this, manufacturers have subscribed to the way consumers have behaved by promoting a linear approach to extracting, processing, consuming and then disposing of raw materials (Ghisellini et al. 2016; Lieder and Rashid 2016). Research by Sheldon and Arens (1932) describes such developments as 'progressive waste' or 'creative waste', which has resulted in unsustainable, and often inequitable, growth patterns (Noble 2018).

Every year, Singapore discards about 700 million kgs of plastic waste of which less than 10 per cent is recycled (World Wildlife Fund for Nature, 2020). Non-recyclable waste in Singapore is incinerated, with the ash dumped at the Semakau island landfill, a site that is expected to be full by 2035 (Geddie 2018). Despite this area of weakness, the country is very effective at using up to 90 per cent of its waste through its Waste to Energy (WTE) plants, which generates significant amounts of electricity that is made available to the national grid (MEWR 2019). Since the 1980s, incineration has been viewed as an effective means of waste disposal for Singapore. However, there are uncertainties as to whether or not such an approach aligns with its SDG goals.

In an attempt to address its own waste management concerns, the Singaporean Government has been an active participant in the High-level Political Forum on Sustainable Development (HLPF), the United Nations' (UN) central platform for analysing the 2030 Agenda for Sustainable Development and its associated SDGs. The 2030 Agenda works with countries to make fundamental changes to the way that societies produce and consume goods and services. The SDG 12 provides key guidelines that help governing bodies implement a range of policies, mechanisms and partnerships that help to ensure more sustainable global consumption and production patterns (SCP). The guidelines also recognize that these SCPs are not only an objective in their own right, but also a key strategic component of efforts to achieve the 2030 Agenda (UNSDG 2018). Embedded within the SDG 11 and 12 target objectives are several important considerations that pertain to the sustainable management and efficient use of natural resources. These include significant reductions in the levels of global food waste and waste generation as well as additional support for developing

countries to develop their scientific and technological abilities in an effort to achieve more SCPs (UNSDG 2018). In particular, SDG targets 11.6 and 12.5 of the 2030 Agenda address cities' waste generation and management impacts (UN 2019).

In some ways, Singapore has made headway on the climate change front since first becoming a signatory to the Kyoto Protocol in 2006 and then adopting the Paris Agreement in 2016. In 2012, it also implemented its National Climate Change Strategy, while the Sustainable Singapore Blueprint and Climate Action Plans were launched in 2015 and 2016 respectively (Ministry of Foreign Affairs, n.d.). Despite such initiatives on the climate change front, researchers are intrigued by the waste management behaviours of Singapore households despite local waste minimization campaigns (Ong et al. 2019, p. 583). An examination of the various waste management initiatives will shed light on some of the challenges of waste management in Singapore that hinder its efforts in practising a sustainable waste management model.

13.4.1 General Waste Management

Over the years, the Singapore Government has initiated various measures to tackle general waste at the community level. These include implementing the National Recycling Programme (NRP) in 2001, in which recycling bags or bins were made available to residents living in both public housing flats, known as the Housing Development Board (HDB), as well as landed properties (ZeroWasteSG 2015), the likes of which are then collected every two weeks by licenced recycling contractors. To complement the NRP, the National Environment Agency (NEA) mandated in August 2007 that all recycling contractors place centralized recycling depositories (CRDs)—one CRD for every five blocks of flats at all HDB estates (ZeroWasteSG[1] 2015). At the local constituency level, the recycling contractors also organize a recycling exchange once a month by working with the Residents' Committee (RC) to establish recycling stations for residents to exchange their recyclables for cash or food items. There are also frequent school-led recycling initiatives in which old newspapers and clothing are collected for fundraising and charity. The students doing the recycling collection for an area usually have to work with the licenced recycling contractors who are in charge of the NRP for that area (ZeroWasteSG 2015). Despite these various local initiatives, the uptake for recycling is still very low; with only 61 per cent of all items recycled in 2018 (see Table 13.1).

[1]Zero Waste SG: is a not-for-profit and non-governmental organization dedicated to help Singapore eliminate the concept of waste, and accelerate the shift towards zero waste and the circular economy. It started as a website in 2008 providing tips and resources on waste minimization and recycling, and is officially registered as a non-governmental organization in 2015.

Table 13.1 Singapore Waste Statistics and Recycling Rate 2018

Waste type	Total generated ('000 tonnes)	Total recycled ('000 tonnes)	Recycling rate	Total disposed ('000 tonnes)
Construction and Demolition	1624	1618	99%	7
Ferrous metal	1269	1260	99%	9
Paper/Cardboard	1054	586	56%	467
Plastics	949	41	4%	909
Food	763	126	17%	637
Horticultural	521	428	82%	93
Wood	320	227	71%	93
Ash and Sludge	240	25	10%	215
Textile/Leather	220	14	6%	206
Used slag	181	179	99%	2
Non-ferrous metal	171	170	99%	2
Glass	64	12	19%	52
Scrap tyres	32	29	90%	3
Others (stones, ceramics, rubber etc.)	286	11	4%	274
Overall	7695	4726	61%	2969

Source NEA Data and Statistics. Retrieved from https://www.nea.gov.sg/docs/default-source/default-document-library/waste-recycling-stats-2016-to-2018.pdf

13.4.2 Plastic Waste Management

The Singapore Environment Council (SEC)[2] reported that Singapore used at least 1.76 billion plastic items a year (The Straits Times, 1 August 2018), including 820 million plastic bags from supermarkets, 467 million PET bottles and 473 million plastic disposable items like takeaway containers. In 2018, only 4 per cent of the plastic waste was recycled, a figure that was down from 6 per cent in 2017 (NEA 2018). Approximately, one-third of the plastic waste is single-use items such as plastic bags and food packaging, although in recent times 12 out of 114 hawker centres in Singapore have stopped using disposable plates and cutlery for those dining in (The Straits Times, 29 December 2019). Meanwhile, Hong Kong started charging consumers for plastic bags in 2015; while Thailand took a step further by banning plastic bags altogether and Indonesia has just announced a ban on single-use

[2] Singapore Environment Council: Established in 1995, the Singapore Environment Council (SEC) is an independently managed, non-profit and non-government organization (NGO). SEC continuously engages all sectors of the community by formulating and executing a range of holistic programmes. Over the years, SEC has given strength and direction to the environmental movement in Singapore.

plastics from street markets and shopping malls in its capital Jakarta starting from June 2020 onwards (SCMP 2020).

In a survey conducted by SEC in 2018, the following observations were made. Firstly, the current rates of consumer consumption present a challenge to plastic recycling due to Singapore's dependence and over-use of plastics by consumers. This strong demand relates to the convenience of the items, the cheap supply of plastics, resistance to change and of taking on greater personal responsibility. Secondly, the study also showed that 70 per cent of the respondents were not aware of the types of plastics that can be recycled in Singapore. Thirdly, from an industry perspective, the main challenge lies in the separation and contamination of recycled plastics. The convenience of the waste chute system in many residential apartments means more plastic goes in the waste stream than in the recycling stream, and then to incineration. Of the plastic that is being disposed of in the recycling bins, there is a high risk of contamination due to the tendency of normal waste being included. Finally, a limited availability of waste collection workers has placed capacity constraints on Singapore's waste collection system. However, as the current rate of recycling is so low and due to the low volumes of recyclables collected, the waste management businesses also do not want to invest in automation technology for sorting waste (SEC 2018).

In 2019, an active campaign was launched to encourage shoppers to bring their own bags while shopping for groceries in Singapore. Despite these efforts, there is no plan to ban single-use plastic bags nor impose levies on their use in the near future. Recycling is not deemed a cost-effective measure as most recycling is done overseas where the process of sorting out recyclable plastics from contaminated plastics is cumbersome and labour-intensive (CNA, 29 April 2019). While recycling plastic might slow the rate of environmental degradation, a more effective approach involves a change in mindset, whereby people have to limit their use of plastics and turn to more sustainable ways of everyday living.

13.4.3 Electronic Waste Management

Another important area of consideration is the area of E-waste, which in Asia alone is estimated to be S$35 billion annually (Baldé et al. 2017). Electronic waste, or e-waste, is defined as 'all items of electrical and electronic equipment (EEE) and its parts that have been discarded by its owner as waste without the intent of reuse' (Baldé et al. 2017, p. 11). It is mostly made up of plastic, heavy metals and hazardous materials and when exposed, it can have devastating effects on the environment and public health (Asia Law Network 2019). E-waste is particularly prevalent in Singapore, with the country having the second highest per capita generation of this form of waste in Asia, with an estimated 60,000 tonnes (60 million kgs), of which only 6 per cent is recycled, according to a survey carried out by NEA (The Straits Times, 1 February 2018). It also has a very high level of e-waste at 19.5 kgs per person, second only to Hong Kong (21.7 kgs) and ahead of Japan (17.3 kgs), South Korea (15.9 kgs)

and Taiwan (18.6 kgs) (The Straits Times, 1 February 2018). While small steps have been made to tackle plastic waste, there is still a long way to go before e-waste can be managed as effectively. At present, the government is mulling over a range of regulations that seek to ensure that discarded items, ranging from refrigerators and washing machines to televisions and mobile phones, are recycled and reused.

The mandatory reporting framework for e-waste management is set to be introduced at the end of 2020 (The Straits Times, 14 August 2018). In order to effectively deal with the problem, the NEA recently announced that it would be enforcing the Extended Producer Responsibility (EPR) legislation for e-waste in 2021 by which producers of electrical and electronic equipment must ensure their products are collected and recycled or disposed of when they reach the end of their lifespans. However, for Singapore to truly boost its e-waste recycling rates, the buy-in from consumers is needed as the NEA's consumer survey found that 6 in 10 Singapore residents do not know, or are unsure of, how to recycle their e-waste (The Straits Times, 14 August 2018). Standing in the way of a proper e-waste recycling infrastructure is the strong informal sector of scrap traders and rag-and-bone men who are generally unskilled and unorganized in their approach to collect e-waste. There is also the lack of a proper e-waste collection systems in Singapore where only a few companies are involved in its recycling, among them Star Hub, the country's second largest telecommunications provider.

13.5 The Informal Waste Sector

The informal waste sector has often played an indispensable role within the waste management systems, particularly in developing countries (Sandhu et al. 2017). For the purpose of this study, the informal waste sector refers to people who make a living from waste and its recycling, but are not formally tasked with providing the service by formal government authorities. The informal sector is generally characterized by small-scale, labour-intensive, largely unregulated, low-technology manufacturing or the provision of services (Wilson et al. 2001) that involve groups that lie on the fringes of society. Such individuals resort to scavenging/waste picking for income generation and in many instances help to ensure their everyday survival (Wilson et al. 2006). It is widespread throughout urban areas in Asia, with some cities such as Beijing, China, having up to an estimated 200,000 active waste pickers (Li 2015). In spite of the roles played by the informal sector, authorities often ignore or repress informal sector agents by either not taking them into account in the design of their management scheme, or by viewing their role within the waste management process as being detrimental to the city's image and as such fight against them (De Bercegol et al. 2017). The uptake of this informal waste sector by the poor and elderly of the society raises eyebrows concerning the welfare of these vulnerable groups and the efficacy in which waste management efforts has been undertaken by the government.

In Singapore, the informal waste sector consists of relatively unskilled and unorganized scrap traders and rag-and-bone men (The Straits Times, 1 March 2018). The traditional unlicensed 'karang guni' man goes from door to door to collect waste items from residents, including newspapers, televisions, radios and computers, in which payment is made directly to the residents for these items. The items are then sold to a waste recycling company or to a second-hand dealer (Zero Waste SG, 25 January 2015). In a national recycling effort conducted in 2016, only 2 per cent of the total amount of waste generated by the domestic sector was collected, whereas the informal recycling sector, which includes rag-and-bone men, for instance, collected almost nine times more (The Straits Times, 1 March 2018). In Singapore, the poor and elderly members of the community also go through rubbish bins in the neighbourhood in an effort to pick up recyclables. They usually sell the recyclables to a waste recycling company or to a second-hand dealer. Many of the workers in the informal sector are independent workers who are not formally recognized by the government as contributing to the national agenda of managing waste in Singapore.

13.6 SMEs and Start-Ups in Waste Management

In recent times, more has been done by small and medium enterprises (SMEs) to incorporate technological innovations within the waste management processes in Singapore. Zerowaste Asia, a Singaporean start-up company, provides one such example. Since 2011, the business has been engineering special chemicals to remove heavy metals from different kinds of waste in a simple, cheap and effective way. In addition to this, it also recycles the detoxified waste into materials suitable for land reclamation and construction. Other Singaporean start-ups are also making impressive contributions, with BlueRen patenting a process that helps to transform plastic waste into carbon nanotubes that can then be used to strengthen concrete. In contrast, Envichem Technologies uses recyclable chemicals to extract high-purity metals from hazardous waste (The Straits Times, 13 July 2016). Other technologies, such as machine learning and artificial intelligence are also helping in the prevention of waste generation. Singaporean start-up, Good for Food, uses these technologies to assist hotels and restaurants in reducing the amount of waste they generate. In this instance, their smart trash cans provide chefs with the data they need on what food is being wasted the most, thereby helping to solve the problem of left overs (Chia and Lim 2019). Other opportunities for better food waste management include composting, generating biogas and using it for animal fodder, with many U.S. cities, like New York, Portland, Seattle and San Francisco already implementing such initiatives (Rueb 2017). In addition to this, Singapore can upgrade its existing practices by trying to find new uses for waste bi-products, as has been the case in the Netherlands and U.S. whereby ash from the incineration process can be used in asphalt or construction materials.

13.7 IoT (Internet of Things) in Waste Management

Globally, governments and companies are looking for solutions to increase the collection level of various waste types by using new technologies and devices such as smart sensors, Internet of Things (IoT), cloud platforms, etc. (Popa et al., 2017, p. 1). Singapore is no exception. Its Smart Nation Agenda has given greater impetus to Internet of Things (IoT) technology and data to manage waste for the city-state. Several studies have proposed efficient solutions for intelligent waste collection mechanisms using IoT. These include the use of Long Range (LoRa) communication technology in a bid to notify collection systems when waste bins are full (Bharadwaj et al. (2016) and the use of an IoT-based system that measure the amount of waste present in residential waste bins (Shyam et al. 2017). In these instances, real-time data could be sent to a local server with the aim of improving garbage-collecting routes in big cities. Another successful IoT-based system for waste control has been adopted in cities throughout South Korea, which makes use of radio-frequency identification (RFID) cards that are situated in the residents' waste bins (Hong et al. 2014). When a resident utilizes these 'smart bins', their waste is weighed, with their information sent to a server that automatically processes this information for billing purposes. The emergence of such technologies creates new waste management opportunities. However, the question remains to what extent these can be or will be utilized in a Singaporean context, what support can local government provide in order to support their implementation?

13.8 Recommendations

13.8.1 A Shift in Developmental Mindset

Are technological solutions necessarily the way forward to solve the global waste management challenge? Perhaps the most pressing issue is about shifting consumption behaviour patterns in a manner that sees individual consumers becoming more active participants in the circular economy. Cultural research helps explain why promoting public awareness of climate change (or in this regard waste management) is inadequate in itself to change behaviour, in particular, the important role that cultural norms play in shaping household consumption in complex and uneven ways (Lorenzoni et al. 2007). While business growth is important, consumers and the various stakeholders have a part to play in this paradigm shift in developmental economics. Neo (2010) suggests the promotion of environmental values in carrying out the National Recycling Programme (NRP), while Ong et al. (2019) suggest that where recycling norms are not entrenched in the first place, environmental values and identity could have a limited effect in initiating behavioural change. Moreover, their study show that individuals who are more far-sighted and concerned with the long-term effects of their everyday behaviours are more likely to act sustainably.

13.8.2 Government Legislation

The quality of Singapore Government's waste management legislation relates poorly to many of its European or other developed country counterparts, particularly in regards to single-use plastics, which have been banned or whereby their usage is charged to the consumers. In recent times, Singaporean environmentalists have been pushing for tighter regulatory provisions around plastic consumption, an important area of concern given that the country consumes at least 473 million plastic disposables and 467 million PET bottles annually (SEC 2018). However, this does not mean that plastic bans will be effective in regulating plastic pollution. Over 127 countries worldwide regulate plastic usage but only one country, i.e. Cape Verde does not regulate plastic production (Excell 2019).

In the case of Singapore, there is no need to reinvent the wheel as authorities can tap into existing collection networks used by public waste collectors in the country to collect general waste. While industrial waste output can be minimized through the introduction of legislation, domestic waste, which is created in far greater volume than industrial waste, is ignored. Most waste in Singapore's high-rise flats is disposed through common internal chutes, where it is very difficult to track the level of per capita waste generated and in turn impose relevant regulations. Even with the introduction of the centralized recycling depositories in August 2007, the uptake of recycling is still poor. There is a need to consider legislation that makes it compulsory for all households to recycle materials like paper, plastic and glass. To do that, adequate infrastructure and support services should be provided for households to exercise those behavioural changes. Education and training are also essential to make people more aware of the need for adopting socially responsible behaviours.

13.8.3 Zero Waste Masterplan

Singapore's inaugural Zero Waste Masterplan, published in September 2019, is a step in the right direction. The key focus of the plan is waste prevention, with the initiative mapping out the country's key strategies to build a sustainable, resource-efficient and climate-resilient nation. This includes adopting a circular economy approach to waste and resource management practices, and shifting towards more sustainable production and consumption patterns (MEWR Press Release, 30 August 2019). One of the key strategies highlighted in the Masterplan is the development of local recycling capabilities and exploring the establishment of local e-waste recycling facilities for large household appliances, household batteries and lamps. At the same time, the NEA is also studying the development of local recycling capabilities for plastics, and exploring plastics recycling solutions and technologies available in the market, and assessing their suitability for adoption in Singapore (MEWR Press Release, 30 August 2019).

13.8.4 The Responsibility of Producers

An important new strategy in the management of waste is to encourage producers to be more responsible for the management of products when consumers are done with them. The Extended Producer Responsibility (EPR) involves a shift in responsibility (administratively, financially or physically) from governments to producers as well as an effort to encourage producers to consider environmental considerations when designing and manufacturing their products (European Commission 2020). In simplistic terms, this policy approach requires producers (brand-owners) to manage their products at the end of their lives through an infrastructure financed by producers and provided as a service to consumers. Overall, consumers would pay for improved environmental performance. However, by including end-of-life management costs in product prices, businesses play a pivotal role in driving innovation in the direction of more sustainable products and services. In addition to this, product waste should be increasingly managed through infrastructure provided and funded by producers as part of the production and consumption system. Governments at all levels can send clear policy signals that the EPR initiative is a key policy platform moving forward. Furthermore, the government can also issue policy resolutions and white papers; ban the disposal of products that can be recycled; require EPR systems for a continually increasing range of products and then keep EPR products out of the waste system. Finally they can also impose disposal surcharges. The fact that the Singaporean Government is looking to pass EPR legislation for e-waste in 2021 shows that positive changes are being made.

13.8.5 Consumers Play a Part

Minimizing waste is of the highest priority for all nations around the world (Bai and Sutanto 2002). For Singapore to do its part and truly boost its plastic and e-waste recycling rates, buy-in from consumers is essential. Results from a recent NEA consumer survey found that 6 in 10 Singapore residents do not know, or are unsure of, how to recycle their e-waste (The Straits Times, 14 August 2018). Better public awareness through education can help to transform Singapore's waste management practices, influencing the way in which local communities respond to changing environmental needs. Like any government-led education campaign, widespread co-operation is needed especially from the public. Abbreviations like NIMBY (not in my backyard), LULU (locally unacceptable land use) (Wilson et al. 2006) and NOTE (not over there either) are frequently used to describe resistance from the public towards new waste management or disposal programmes. Educational initiatives are an important means of softening these views. Waste management campaigns must begin with the dissemination of information to better inform communities of the relevant campaign's objectives.

In addition to this, Singaporean consumers can also vote with their wallets. Companies, like Miniwiz, a Taiwan-based upcycling company has created hundreds of new materials from trash including e-waste. These materials can be used to create clothes and even sunglasses, as well as for use in buildings. However, without consumer demand, manufacturers will not be motivated to use recycled materials. In the end, the market decides what products should be made. More specifically, if you do not buy recycled products they will never be made (The Straits Times, 14 August 2018). Despite various obstacles, Singaporean consumers are becoming more aware of the need to change. A recent 2019 NEA survey, shows that an increasing number of Singaporeans are now more cautious about food waste and as such are packing left overs, using refrigerated food more efficiently as well as even composting food waste at home (Elangovan 2019).

13.9 Significance of the Study

This study is significant in that it provides invaluable insights into a global issue relating to plastic waste management and its challenges. Underlying the impetus for the development of 'Waste-Wise Cities' by the United Nations in 2018, it is apt to draw lessons from a developed smart nation-state of Singapore. The case study of Singapore clearly demonstrates that even a developed city with its Smart Nation agenda as Singapore does not have all the answers to a very complex problem which often entails a shift in mindset and behaviour change in order to act sustainably.

13.10 Conclusion: A City in Transition

In Singapore, the Smart Nation initiative has been established to transform the waste management practices across the country. Technological advancements and the development of core government policy initiatives will help to ensure the sustainable management and efficient use of the country's waste materials. As part of this, Singapore also reduces the amount of waste generated in an effort to create a more circular-driven economy. Singapore has taken some important first steps in raising awareness about the need to implement plastic and e-waste management practises, which are closely linked to the SDGs 2030 Agenda. While it has a Zero Waste Masterplan in place, Singapore is still very much a country in transition.

To tackle its plastic and e-waste challenges, Singapore can do more to promote research and development, and innovation in new recycling technologies. In addition to this, it can also support the development of regional capabilities in the ASEAN region through its technological know-how and R&D capabilities. The collection of plastic waste and recycling is a very regional/global effort.

Finally, the onus is on the Singapore Government to work with different stakeholders, including research institutions and local communities to develop effective

recycling plans that are simple to implement. In order to do this, consideration has to be given to ensure sustainable urban planning, the collection and safe disposal of solid waste, while also minimizing the existence of toxic materials, waste and pollutants throughout the entire production/consumption cycle. It is not so much about having a marginal increase in recycling rates, but really about a paradigm shift in the way the country perceives plastics and waste in general.

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Chapter 14
A Tropical Agenda for Future Research

Simona Azzali and K Thirumaran

Abstract The tropics are home to nearly half the world's population, have rapid population growth forecast and have significant economic and social inequality challenges. Significant urbanisation is underway in Southeast Asia. By 2030, an additional 90 million people are forecast to move to ASEAN cities. These urban populations are expected to triple by 2050. Issues like poverty, inequality, unsustainable energy consumption and declining infrastructure will shape government and business decisions for years to come. While our tropical environment is urbanising faster and faster, we are often unable to cope with—and adapt to—the challenges brought by these changes. What processes can be used to reduce inequities and injustices in the tropical built environment? This book has clustered the various topics under several tropes addressing resources, local frameworks and urban design and planning. The works though are in variety, we admit that there is more work needed to explain and explore to further advance our understanding of the dynamics of the tropics.

Keywords Tropics · Constrained Environments · Sustainability · Tropical Agenda · Tropical Environments · Urbanisation

The tropics as a region has a global business and social imprint from within and with the interactive outer. Over the centuries much of the tropics had entered a discourse with more developed regions of the world, particularly Europe and North America, with an intensive exchange of technology, international trade, institutional policy frameworks and, most importantly, cultures and ideas. The postcolonial period has certainly accelerated those values exchanged and continues to be part of the negotiated space of international business relations and the interactive communities.

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Given the historical continuities and postmodern values mixed in with the geophysical realities (Hsiang and Meng 2015), has businesses and societies in the tropics adapted? How to make urban settings less environmentally and socially vulnerable and how to increase resilience and sustainable adaptation?

In these concluding remarks, our intention is not to attempt a summary of the preceding chapters; rather, to pick up on relevant broad trends developing in the study of tropical constrained environments. There are of course a vast number of challenges not highlighted in the chapters and we will address them within the context of an emerging field on the tropics. There are two identifiable gaps and important trends that we believe are most pressing topics that need to be addressed and require further research.

1. Vulnerability of tropical constrained environments vs sustainable adaptation
2. People-oriented and community-centric approach

The tropics are home to nearly half the world's population, have rapid population growth forecast, and significant economic and social inequality challenges. Significant urbanisation is underway in Southeast Asia. By 2030, an additional 90 million people are forecast to move to ASEAN cities. These urban populations are expected to triple by 2050. Issues like poverty, inequality, unsustainable energy consumption and declining infrastructure will shape government and business decisions for years to come. While our tropical environment is urbanising faster and faster, we are often unable to cope with—and adapt to, the challenges brought by these changes. What processes can be used to reduce inequities and injustices in the tropical built environment? Climate change, natural disasters and, most recently, infectious disease as COVID-19 have revealed the vulnerability of our cities and urban habitats. For vulnerability, we refer to the inability of a system or a unit to withstand the effects of a hostile environment, community or coloniser.

This book has clustered the various topics under several tropes addressing resources, local frameworks and urban design and planning. The works though are in variety, we admit that there is more work needed to explain and explore to further advance our understanding of the dynamics of the tropics. A survey of journals that directly addresses the communities and businesses in the tropics, yielded a considerable body of knowledge. There were 24,855 scholarly and peer-reviewed articles published from 1 September 2010 to 30 August 2020 in a word search 'tropics business' and 'tropics society' on a university's search engine called *One Search.* Of the published articles, 445 specifically addressed business issues in the tropics while anthropology and sociology (assumedly represents 'society') contained 1085 works.

The readings in this edited volume also suggest a clear institutional framework that designates local resilience and at times is accentuated by international interests and continuous interaction. For example, Chap. 13 (Wong, Wood & Paturi) describes the state's determination to transform Singapore into a technology-driven and efficient public channelling of waste control and management. Similarly, in Chap. 6 (Azzali et al.) national tourism policy in Bhutan converges with sociocultural frameworks to forge a common public and community effort to protect the natural environment

and yet reap the benefits of limited tourism. The threat to biodiversity in the natural environment due to increase urbanisation or simply accommodating large numbers of regular flows of nature tourists can impact and have impacted many parts of the Amazonia, Africa and Asia all in the name of development. Yet again, the old adage in much of the developing tropics, there is the tussle between the poverty, forest clearing for farming and industrial/tourism development as well as the harvesting of natural resources such as minerals and tree loggings or animal poaching (Adityanandana and Gerber 2019; Chomitz 2007). Studies have made claims and counterclaims on these issues that matter to communities and businesses with a degree of 'confounding environmental variables' (Sullivan et al. 2017, p. 6) that there is still uncertainty on the strategies and approaches local institutions can successfully employ for a sustainable community and planetary environment.

Another strong issue that impedes community living and businesses is the periodic threat of infectious diseases. Just as businesses moved from one recession to another and recovery to expansion, the tropics and the world was hit by a series of epidemics and pandemic as well. Ebola, West Nile Virus, MERS, Zika epidemics while contained, have had great impacts on communities stretching from Sahara Africa to the Middle East. However, the COVID-19 virus pandemic has made the resilient communities reeling from boundary closures and strict curtailment of movements. Yet, there is a pent-up desire for businesses to reopen to the world. Many journals have published and are accepting various forms of research related to this infectious disease and expect similar life-threatening diseases to emerge as we experiment with viruses, interact with the wild and other unexpected and unpredictable occurrences.

It is critical to find creative and sustainable but also very concrete solutions to address most pressing urban issues and build tropical resilience and developing research and design capability in areas related to urbanisation and sustainable adaptations in the tropics, by engaging with industry and bridging academic knowledge and real-world issues to create better tropical environments. One way, as this volume has showed, is adopting a people-oriented and community-centric approach, by respecting both the people and the environment. For example, addressing climate change in a built environment means to address social vulnerability as well.

Some lessons can be derived

- Learning from our past and traditions.
  Looking at history is a useful tool for understanding the origin of a problem. Analysing past experiences and precedents not only provide a big picture and lead to a better understanding of a problem but may also suggest potential solutions. Indeed, the built landscape around us is an expression of our civilisation, and monuments are symbols of civic, moral and religious values (Azzali 2019). A successful sustainable adaptation strategy should consider the existing urban fabric, using a methodology cantered on the interpretation of the pre-existent context: the old urban fabric is a source of generative ideas and design principles, which are embedded into the historical layering of design concepts (Petruccioli 2007; Furlan and Petruccioli 2016).

- Learning from people and local communities yet, empower local communities. All members of the community require some level of awareness, through inclusive education, training and capacity building. Participation processes allow to educate communities about poorly understood problems and policy issues, which builds understanding and incentives for collaboration (Burby, 2007), improving local communities' self-reliance, social justice and participatory decision-making. Broad public involvement creates the potential to expand understanding of problems and to develop a stronger set of policies for dealing with them.
- Learning from the environment. The integration of nature in the built environment is a key concern of sustainability and adaptation. But what does nature teach us? On one hand, several studies have shown that proximity of green spaces and parks to housing facilitate community interaction, well-being and satisfaction and that there is a direct link between urbanisation and a rise in mental and behavioural disorders, increasing social isolation, an increased prevalence of lifestyle-related diseases, including hypertension, diabetes and obesity (Nutsford et al. 2017). On the other hand, despite the overwhelming evidence pointing to the existence and severity of climate change, governments have largely failed to deliver on their obligations to their communities to adequately respond and prepare them.

The undertaking of these approaches will help reduce the impact of rapid changes and rapid urbanisations threats on tropical communities and businesses and allow them rapidly and smoothly adapt to changing environmental and social conditions.

The various chapters add a tropical perspective to sustainability, resilience and adaptation of constrained environments and attempts to define some broad trends and challenges that are important in the future of this geographical region. We hope readers will find theoretical contributions to the literature not only useful but also the practical insights to build better environments and create social change.

This book endeavours to inform readers that while this project has been comprehensive, there is still a need to address many more issues, strategies to explore and lessons to learn. Given that the tropics run across three continents, vast swathes of land with climate and vegetation variety, businesses and societies continue to find the tropics a region of vibrant and lucrative growth region. As scholars, we need to further advance our epistemological inquiries to arrive at the ever elusive and yet consensual seeking approach to alert and support communities and businesses with insights to their progress in a constraining environment of the tropics.

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