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The Value of Biodiversity in Chinese Urban Parks from a Social Perspective

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Abstract

While ornamental and recreational functions were traditionally the focus of urban parks in China, biodiversity conservation/enhancement has been increasingly seen as a prioritised goal. This promotes the use of the biodiversity-friendly approach in park design and the rise of a novel park style with a wild, less manicured appearance in Chinese cities. Such a park style contrasts with the traditional park style that has ornamental, manicured characteristics. Professionals state the benefits of the biodiversity-friendly approach, but the Chinese public's response to this new approach remains unclear.

This research links the social and biodiversity values of Chinese urban parks by investigating how the public responds to the biodiversity-friendly approach to park design. More specifically, this research aims to 1) understand public reaction to biodiversity in urban parks, 2) investigate public perceptions of and preferences for the wild park style in contrast with the traditional style, and 3) examine preferences for park biodiversity and for the wild park style among the public's different sociocultural groups and between the public and ecology/landscape professionals. A mixed-method approach, comprising focus groups, conjoint analysis and semi-structured interviews, was applied to address the three objectives. The study was conducted in Hangzhou and Shanghai, two Chinese cities that have strong contextual and temporal legitimacy of the biodiversity-friendly park approach but where local residents' perceptions have been almost ignored.

The key findings revealed that in general, the public in both Hangzhou and Shanghai demanded higher levels of biodiversity in parks. Residents of Hangzhou prioritised both biodiversity and facilities as the most important

attraction factors of parks, whereas residents of Shanghai valued facilities the most and considered this factor more important than biodiversity. Residents of both cities generally showed a greater preference for the traditional park style over the wild style, yet preferences for the wild park style were enhanced when it demonstrated higher maintenance levels and contained more good facilities and semi-open vegetated areas. The study found the importance of ecology/landscape professional involvement and education for the appreciation of biodiversity in parks in Shanghai. Moreover, professionals preferred the wild park style and had a significantly higher preference for this style than the public in both cities.

This research found that there was public demand for integrating higher biodiversity levels into park design but that this demand existed within a framework of good amenities and the traditional park style. This study's findings partially support existing policies and practices for the biodiversity-friendly development of urban parks in China. Public engagement and differences in residents' preferences compared with professionals should be incorporated into China's biodiversity-related landscape development. This study provides a reference for Chinese urban parks in search of win-wins of biodiversity improvement and social expectation.

Lay Summary

Anthropocentric goals, such as ornamental and recreational functions, have traditionally been emphasised as the focus of Chinese urban parks, resulting in the dominance of a park style with manicured and ornamental characteristics, termed the traditional park style, in China's urban green spaces. Environmental challenges and the increasing loss of biodiversity in China have driven the search for new design approaches to guide parks to be more biodiverse in order to contribute to more ecologically balanced and sustainable cities. There is an advocacy for the prioritisation of biodiversity conservation/enhancement in park design with the implementation of a biodiversity-friendly approach. This has promoted the emergence of a new park style in Chinese cities, which is wilder and less manicured. Termed the wild park style, it contrasts with the traditional style that urban residents may have been accustomed to for some time. Although claims are made by landscape/ecology professionals regarding the benefits of the novel biodiversity-friendly park approach, there remains an insufficient understanding of the public's perceptions, experiences and preferences.

This research aims to bring the social perspective into the biodiversity-friendly park approach in China and to help inform its design, implementation and management to realise more sustained community co-benefits. Driven by this main aim, this research has three objectives: 1) to understand public reaction to biodiversity in urban parks, 2) to investigate public perceptions of and preferences for the wild park style in contrast with the traditional style and 3) to examine preferences for park biodiversity and for the wild park style among the public's different sociocultural groups and between the public and ecology/landscape professionals. A combination of three research methods was used, namely, focus groups, adaptive choice-based conjoint

questionnaires and semi-structured interviews. The research was conducted in Hangzhou and Shanghai. The biodiversity-friendly approach has been highlighted in the two cities' urban park planning and design, but local residents' opinions remain important gaps in our understanding.

The research showed a general demand for more biodiversity richness in urban parks among residents in both cities. However, when comparing biodiversity with other relevant environmental aspects (i.e. facilities, woodlands, maintenance and seasonal views) in terms of their importance in parks, residents from Hangzhou valued both facilities and biodiversity as the most important aspects, whereas residents from Shanghai placed greater value on facilities and considered them the most important aspect. Residents of both cities generally preferred the traditional park style, but preferences for the wild park style were enhanced when it showed higher maintenance levels, more facilities and more semi-open vegetated spaces (e.g. creating lines of sight and allowing use for activities). In Shanghai, the professionals valued biodiversity in parks more highly than did the general public. Preferences for biodiversity in parks were higher among better-educated individuals among Shanghai residents. In both cities, preferences for the two park styles varied between the public and the professionals: while the public tended to prefer the traditional style, the professionals preferred the wild style and showed a higher preference for this style than the public.

This research suggests that future biodiversity-friendly park approach in China should ensure good amenity provision and can combine elements from the traditional park style, and differences in professional preferences compared with the public should be considered. This work has implications for the biodiversity-friendly approach to park design in China to better understand social experiences and gain broader societal support.

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List of abbreviations

CBM	City Beautification Movement
UGS	Urban green space
BGI	Blue green infrastructure
USV	Urban spontaneous vegetation
CTC	Cues to care
NNF	Near-natural forest
NbS	Nature-Based Solutions
IGS	Informal urban green space
BYO	Build Your Own
HMR	Hierarchical multiple regression
HZ	Hangzhou
SH	Shanghai

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2. Hu, X. and Lima, M.F. (2019) 'Ecological value of abandoned wild landscapes in Chinese cities', in S. Mambretti and J.L. Miralles i Garcia (eds) *WIT Transactions on Ecology and the Environment*. WIT Press, pp. 331–342. Available at: <https://doi.org/10.2495/SC190301>.

PART I (Chapters 1, 2, and 3)

Chapter 1: Introduction

1.1 Background and context

1.1.1 Biodiversity-friendly approach to urban park design

Historically, the design of urban parks in Europe and America strongly considered social issues, such as public health, social welfare, human recreation and aesthetic needs (Ward Thompson, 1998; Cranz and Boland, 2004; Tate, 2018; Kohout and Kopp, 2020). Parks were often designed with open, neat lawns with clumps of trees and orderly flowerbeds and plantings, presenting ornamental and manicured characteristics. Since the late 20th century, environmental problems, biodiversity loss and people's alienation from nature have become more obvious. At the same time, the multiple benefits of biodiversity for sustainable urban development and human well-being have increasingly been recognised (Dearborn and Kark, 2010; Keniger *et al.*, 2013). Against this background, conserving and enhancing biodiversity have been promoted as an important park design aim. A variety of biodiversity-friendly design strategies have been developed, including naturalistic/ecological plantings (Dunnett and Hitchmough, 2004), the use of (but not limited to) native species (Cranz and Boland, 2004) and spontaneous vegetation (Kühn, 2006), *biodiversinesque* landscape style (Ignatieva, 2018), and rewilding (Jorgensen and Keenan, 2012; Kowarik, 2018).

Among different biodiversity-friendly strategies, there is an increasing interest in integrating wild ecosystems that involve natural succession and processes into park design. Largely integrating wild ecosystems into parks can be seen as a wildness strategy for biodiversity conservation/enhancement (Kowarik, 2018). Visually, urban parks designed with this strategy have wild, informal and less

manicured characteristics, unlike many ornamental traditional parks consisting of neat lawns with emergent trees and tidy plantings. Here, the meaning of “wildness” or “wild” is not synonymous with remote, pristine areas completely absent from human impacts. Rather, it refers to the process by which ecosystems are developed with natural succession, whilst not precluding some forms of human intervention (for example, design skills and maintenance). There is no binary of wilderness-human, especially in cities; urban areas perceived to be wild today are often influenced, shaped or modified by humans to varying degrees (Cronon, 1995; Threlfall and Kendal, 2018; Sonti *et al.*, 2020). Acknowledging “wild” in cities is defined inclusively, in this thesis, the term “wild parks” is used to refer to urban parks designed with the biodiversity-friendly, wildness strategy. These parks are primarily wild and less manicured and contain limited man-made structures and elements. There are some representative wild park cases in Europe, for example, Berlin’s Natur Park Südgelände and London’s William Curtis Ecology Park (now redeveloped). While the wildness strategy is an important part of the biodiversity-friendly approach, parks designed with the formal strategy, such as non-naturalistic ecological woodland or herbaceous plantings (Jorgensen, 2004) or hedged vegetated bosquets in French historical parks (Ignatieva, 2021), may also serve as urban wildlife habitats.

1.1.2 The Chinese panorama

In China, existing urban parks predominantly feature well-mown, short turfgrass lawns with trees, ornamental flowerbeds, facilities and built structures (Hu *et al.*, 2022). This is a major result of the country’s City Beautification Movement (CBM) that started in the 1980s (Yu and Padua, 2007; Chen and Li, 2021). One important aspect of the CBM is the building of urban parks to improve the image of cities, aid urban economic growth, give residents and investors a clean and favourable impression of Chinese cities and meet increasing public recreation

demands. Many urban parks have been built in China since the 1980s (Figure 1.1). This extensive construction has primarily emphasised and promoted the parks' ornamental and recreational roles (Chen and Li, 2021).

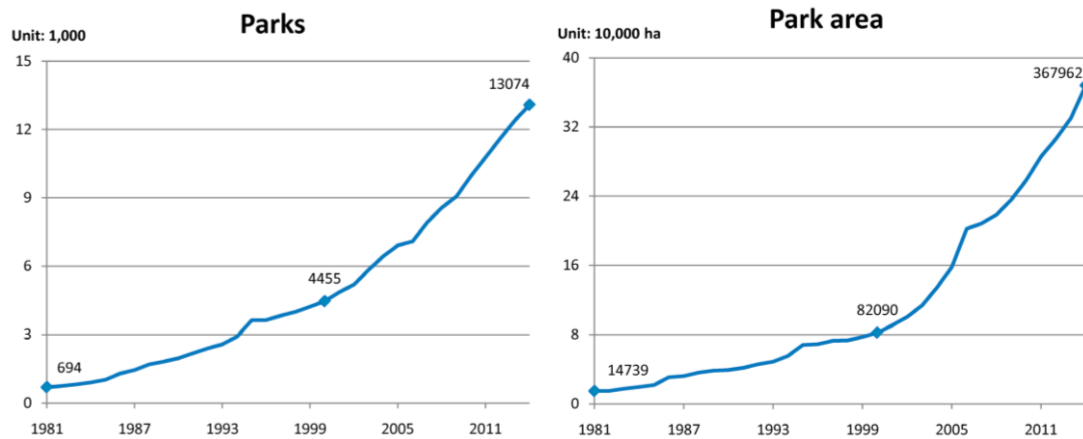


Figure 1.1 The number of parks (left) and the park area (right) in China between 1981 and 2014 (Wang and Liu, 2017)

Along with the CBM, the market economy has entered China as a result of the Economic Reform that was implemented in 1978. With the increasing pace of urbanisation, westernisation and globalisation, lawns, flowerbeds and monoculture, which are absent from Chinese classical gardens (Yang *et al.*, 2019a), have formed a significant proportion of China's urban landscape and have become a symbol of modernity, wealth and the prosperity of the market economy (Ignatieva, 2018). In addition, the functional aspects of parks have been emphasised by incorporating artificial facilities, squares and venues to favour public recreation demands (Yu and Ji, 2000). These parks are heavily maintained in terms of irrigating, pruning, mowing and applying pesticide/herbicide/fertiliser. For example, park lawn mowing is a weekly maintenance activity in Dalian, a Chinese port city (Yang *et al.*, 2019a). Irrigation of Beijing's parks and green spaces uses $2.19 \times 10^8 \text{m}^3$ of water annually, accounting for 16% of the city's total water consumption (Wei *et al.*, 2003).

Due to China's rapid urbanisation, a growing concern about the existence of natural habitats and wildlife has been articulated. The Ministry of Ecology and Environment (MEE, 2010) reported that 90% of the grasslands have been degraded by varying degrees. From 1992 to 2012 in the Pearl River Delta region, 25.79% of the natural habitats and 41.99% of the natural wetlands were usurped by urbanisation (He *et al.*, 2014), including the construction of traditional, ornamental and heavily maintained urban parks (Figure 1.2). Moreover, as Chinese cities become more and more urbanised and denser, residents risk being increasingly disconnected from nature in their daily lives, threatening people's physical and mental health (Yuan, 2021; Hu *et al.*, 2022). In 2012, the *Ecological Civilisation Policy* advocating *Ecology First, Green Development* was proposed by the Chinese government as a new national ecological urbanisation plan. The slogan "promoting ecological progress and ecological quality" (Chen and Li, 2021, p. 2) has been embedded in the master blueprint for urban development and urban green space (UGS) planning and design policies. Scholars and designers advocate that Chinese urban parks should extend their ecological role of promoting biodiversity beyond that of urban decoration and human recreation (Yu, Li and Ji, 2001; Da and Song, 2008; Da and Guo, 2014; Wang, 2021a).



Figure 1.2 Traditional parks in Chinese cities (photographed by the author)

Against this backdrop, China has implemented several city programmes, for example, Forest City and Sponge City, promoting the use of urban parks and green spaces as ecological infrastructure in response to biodiversity loss, urban flooding, air pollution and other environmental challenges. Several Chinese landscape professionals (e.g. Kongjian Yu, professor at Peking University and director of Turenscape; Xiangrong Wang, professor at Beijing Forestry University and director of Atelier DYJG) adapt the design of urban parks to be biodiversity-friendlier, underpinned by the prioritisation of ecological and biodiversity conservation/enhancement. The Chinese biodiversity-friendly approach focuses on working with nature and largely involves the restoration and creation of wild-looking ecosystems, for example, wetlands and forests, by using native plant species. Wetland parks and forest parks are high on the urban agenda. More recently, there has been a strong interest in incorporating natural succession into the design and management of plant communities (Li *et al.*, 2019b; Yuan *et al.*, 2021). Over the past approximately 20 years, wild parks have been built in several Chinese cities (Figure 1.3), and have been promoted as essential components of urban blue-green infrastructure (BGI) to support urban biodiversity and to provide multiple ecosystem services for human self-interest (Fisher and Brown, 2014) (e.g. stormwater management, nature experience and environmental education).



(a) Jiangwan Eco-Green Space, Shanghai



(b) Jiangyangfan Eco-Park, Hangzhou

Figure 1.3 Wild parks in Chinese cities (photographed by the author)

1.1.3 The social perspective

Designers and professionals advocate the biodiversity-friendly park approach and believe in its values and benefits. However, how the general Chinese public

responds to it has received scant attention and has remained unclear. The biodiversity-friendly park approach and the associated novel wild park style contrast with the common, familiar traditional parks in China primarily marked by intensive maintenance, ample facilities, and relatively simple vegetation structures (e.g. lawns with single-tiered trees). If the novel park approach and style in populated urban settings are not socially accepted, then it is difficult for the parks to truly achieve ecological and sustainable goals (Jorgensen, 2004; Haase *et al.*, 2017). Landscape perception and experience can strongly influence human decision-making and behaviours, thereby affecting a landscape and its ecological soundness (Gobster *et al.*, 2007; St John, Keane and Milner-Gulland, 2013). Thus, social acceptance and a pleasant landscape experience are a critical condition for sustaining the ecological integrity of a landscape.

Enhanced biodiversity and ecological benefits may not ensure a pleasant landscape experience. There have been professional concerns about potential problems associated with the biodiversity-friendly approach in cities, for example, mosquitoes, safety and “messiness” (Wang, 2021b; Yang, 2021b; Yuan, 2021), which may influence public well-being and support for the biodiversity-friendly approach. For example, some wild parks in China involve bird-friendly design by including large-scale wetlands and bogs, but this can attract mosquitoes and pose a public health problem (some mosquito species can complete the aquatic stage of development in only seven to 10 days) (Yang, 2021b). This problem can be more noticeable in the humid Southern Chinese cities (Wang, 2021b). Wild parks can be perceived unsafe when dense vegetation obscures visibility, and they may also be perceived as weedy and unkempt as a sign of “abandonment” and a lack of care (Yuan, 2021). Perhaps because of these concerns, the biodiversity-friendly approach is still only implemented on a small scale in Chinese cities, and the wild park style

comprises only a tiny fraction of the urban landscape. The fundamental difference between biodiversity conservation/enhancement in urban and rural areas (e.g. in nature reserves or national parks) is that cities are highly populated areas (Yang, 2021b). Relevant decision-makers and professionals involved in UGS design for biodiversity should take human responses and needs into account to seek a co-benefit situation between biodiversity conservation/enhancement and social expectation.

In China, UGS planning and design are strongly government-led. Engaging residents in park design may not be that common compared with the approach in developed countries (Zhou *et al.*, 2021). In the UK, the initiatives of local communities and volunteer groups strongly influenced the growth of urban naturalistic landscapes and nature conservation (Goode, 1989; Ozguner, Kendle and Bisgrove, 2007). Similarly, the creation of Natur Park Südgelände was largely supported by the local public (Kowarik and Langer, 2005). In China, however, most wild park projects are led by governments and professionals, and residents' involvement is rare. However, the value of public opinion in shaping biodiversity-related UGS policies, planning and design is gradually gaining recognition among Chinese decision-makers, scholars and practitioners (Shao, Xu and Yuan, 2021; Zhong, Yang and Xue, 2021). Understanding public perception is a critical dimension for future biodiversity-related park policies and practices to provide more co-benefits.

When bringing the social perspective into the biodiversity-friendly park approach, important questions to consider are how the public perceives and prefers biodiversity in urban parks and whether they agree that biodiversity conservation/enhancement should be a prioritised concern in park design in trade-offs with other design aspects (Research objective 1). A number of studies on public perceptions of and preferences for biodiversity in UGSs were

conducted in Europe and America (Lindemann-Matthies and Marty, 2013; Qiu, Lindberg and Nielsen, 2013; Fischer *et al.*, 2018). Most studies used species richness as a biodiversity indicator to communicate with the public. Compared with Europe and America, similar work in China is limited (Zhong, Yang and Xue, 2021). Botzat, Fischer and Kowarik (2016) noted that current studies on the people-biodiversity interface in UGSs have a clear geographical focus on developed countries, whereas there are fewer studies in developing nations:

“These findings are alarming as most research comes from developed countries, whereas urbanisation and the potential ‘extinction of nature experience’ (Miller, 2005) is expected to be more rapid in the developing world, especially in Africa and most countries of Asia (United Nations, 2014). A better understanding of perception/valuation of biodiversity in regions facing rapid urbanisation would help to gauge public support for designing and planning urban greenspaces that provide benefits and also counteract biodiversity loss.” (Botzat, Fischer and Kowarik, 2016, pp. 223-224)

Another important question concerns public perceptions of and experiences with the novel wild park style versus the traditional style and preferences between the two (Research objective 2). As mentioned before, wild parks currently constitute a small portion of Chinese UGSs. Yet, if they continue to be implemented, it is important to explore public responses, preferences and acceptance compared to the more common traditional parks. Western studies have explored public perceptions of and preferences for ecological design practices (Nassauer, Wang and Dayrell, 2009; Gobster *et al.*, 2021) and the naturalistic/wild style of parks and other designed urban landscapes (Ozguner and Kendle, 2006; Jorgensen, Hitchmough and Dunnett, 2007; Ignatieva *et al.*, 2017; Fischer *et al.*, 2020). Several studies on preferences for urban spontaneous vegetation (USV) (Li *et al.*, 2019b), meadows (Jiang and Yuan, 2017), and biodiverse lawn alternatives (Yang *et al.*, 2019b), were conducted in China. More research is needed to understand public experiences and preferences for the wild park style and the experiential interactions with and underlying meanings attached to this novel park style in China.

More consideration should be given to if and how preferences for biodiversity in parks and for the wild park style vary between different sociocultural groups among the public, and between the public and ecology/landscape professionals (Research objective 3). Several Chinese studies investigated preferences for USV and urban meadows between different sociocultural groups (Jiang and Yuan, 2017; Li *et al.*, 2019b), but their findings were inconsistent to some degree. More attention to individual-level, preference heterogeneity helps to identify varying public demands in detail rather than treating the target population as a simple entity (Keane *et al.*, 2016). Additionally, there is a lack of research on the comparison between public and professional preferences for biodiversity and the wild park style in China. Such a comparison would help to understand if the two groups have conflicting preferences, which is vital for providing implications for future park design that addresses public needs.

1.2 Research aims and questions

Based on the issues stated above, this research aims to bring the social perspective into the biodiversity-friendly approach to Chinese urban parks to link biodiversity and social values of urban parks. Specifically, the main research question is:

In urban park settings, how does the public respond to biodiversity and the wild park style that recently emerged in China?

Based on this main research question, three research objectives and questions were formulated:

- **Research objective 1:**

To understand public reaction to biodiversity in urban parks. The research questions for this objective are:

1. Does the public appreciate biodiversity in urban parks?
2. What is the importance of biodiversity in urban parks compared to other park attributes?
3. What are the interactions between public preferences for biodiversity and for other park attributes?

- Research objective 2:

To investigate public perceptions of and preferences for the novel, wild park style in contrast to the traditional park style. The relevant research questions are:

4. How does the public perceive wild and traditional parks?
5. Between the wild and traditional park styles, which one is preferred by the public and why?
6. What environmental interventions would enhance public preferences for wild parks?

- Research objective 3:

To examine preferences for park biodiversity and for the wild park style between different sociocultural groups among the public, and between the public and ecology/landscape professionals. The research question is:

7. How do preferences for park biodiversity and for the wild park style vary between different sociocultural groups among the public, and between the public and professionals?

1.3 Research theoretical background and methodology

The research questions in this thesis were explored within theories of landscape perception and preference (Tuan, 1974; Bourassa, 1990), land ethic

(Leopold, 1949), ecological aesthetics (Gobster *et al.*, 2007), cultural sustainability (Nassauer, 1997) and cues to care (CTC) (Nassauer, 1995). The framework of landscape perception and preference forms the basis for understanding experiences of landscapes, whereas theories like land ethic, ecological aesthetics and CTC are particularly important for understanding experiences of landscapes associated with ecology and biodiversity. Previous landscape perception and preference studies predominantly concentrated on the visual dimension by using photographs or slides to represent the real landscape and asking questions about respondents' likes and dislikes. While the visual-based approach is useful, especially with regard to visual perception and preference, it often ignores other sensory perceptual dimensions, such as audio, tactile and olfactory. All these dimensions are particularly important in contributing to landscape perception and preference, especially biodiversity-related landscapes (Gobster, 1999). The visual-based approach seeks to know people's simple responses (e.g. likes and dislikes) but tends to ignore rich, complex and even ambivalent feelings that are usually associated with biodiverse and wilder landscapes (Jorgensen and Tylecote, 2007). Gobster (1999) asserted that there is a need to "expand the repertoire of methods" (p. 61) when investigating how sustainable ecosystems are perceived and experienced. He suggested a series of "experiential approaches," including in-depth interviews, focus groups and aesthetic experience diaries. As he noted:

"Investigations of some of the ecosystem- and experience-related phenomena mentioned above will require new and innovative methods. 'Experiential approaches' to landscape assessment include a wide range of qualitative and quantitative methods (Gobster, 1990), and hold significant promise for gaining a better understanding of how sustainable ecosystems are perceived and experienced." (Gobster, 1999, p. 61)

In this research, a mixed-methods approach was applied, consisting of qualitative focus groups, quantitative conjoint analysis, and qualitative semi-structured interviews. Conjoint analysis is a novel quantitative research method

to investigate people's preferences. As one of the most robust methods to explore preferences (Lima, 2016), it has been used in different fields, such as conservation science (Giergiczny and Kronenberg, 2014; Keane *et al.*, 2016), landscape perception/design (Aspinall *et al.*, 2010; Stanton, 2016; Veitch *et al.*, 2022), and urban planning/design (Lima, 2016), but very limited work has been conducted in related fields in China.

Two Chinese cities, namely, Hangzhou and Shanghai, were used as case study cities due to the active incorporation of ecological and biodiversity concepts into the two cities' UGS planning and design and to the larger scale of wild park practices in these two cities compared to other Chinese cities (see Chapter 4, Section 4.3.1). However, the responses of the two cities' residents to the strong contextual and temporal legitimacy of the biodiversity-friendly park approach have been almost ignored.

The empirical investigation included three phases in a linear progression, with relevant output from one phase gradually influencing the next one. Phase I involved focus groups with local residents. This phase aimed to qualitatively explore residents' understandings of and views on important aspects of urban parks and biodiversity as well as experiences with the selected wild park and traditional park sites. The relevant results from the focus groups provided the basis for generating park attributes that participants felt important to inform conjoint analysis design in Phase II.

Phase II used conjoint analysis to quantitatively investigate preferences for biodiversity in parks, preferences between wild and traditional park styles, beneficial environmental interventions for the wild park style and preferences between different public groups and between the public and professionals. Conjoint analysis provides a powerful and robust means to understand how

people trade off and value different attributes of an object (for this study: how people value the attribute of biodiversity in an urban park), how people respond to different object scenarios composed of varying levels of attributes (for this study: the wild park scenario and the traditional park scenario), what changes of existing object scenarios can increase preferences (for this study: beneficial environmental changes of the wild park scenario) and preferences between different groups. In this study, urban park was the “object.” One park attribute was set as “biodiversity” because it is the research interest. Other park attributes were generated from the relevant data of focus groups. Phase II involved a larger sample of participants in Hangzhou and Shanghai, including the public and ecology/landscape professionals.

Phase III consisted of semi-structured, in-depth interviews with volunteer public and professional respondents who were involved in the conjoint analysis. The data from follow-up interviews added value to the research by exploring and interpreting notable findings from the conjoint analysis in greater detail, providing more in-depth and detailed information for research questions and covering issues not previously addressed. Additionally, interviews with professionals helped to understand their views and interpretations of the findings of this research and shed light on implications for practices. In answering research questions and addressing the main research aim, the findings of all research methods were interpreted via the triangulation strategy and with the reviewed literature to build strong empirical evidence.

1.4 The usage of the concepts of “biodiversity” and “urban biodiversity” in this research

The concepts of “biodiversity” and “urban biodiversity” are complex and multifaceted, and their definitions can vary between disciplines, scholars, and

contexts. Given their complexity and their significance for this study, it is crucial to clarify their definitions and provide a clear understanding and the scope of these concepts in this study beforehand. A detailed review of the concepts is presented in section 2.2, Chapter 2.

The Convention on Biological Diversity (CBD) signed in 1992 (United Nations, 1992) greatly brought the issue of biodiversity to a wider audience including policymakers, scientists, researchers, and the public (Bermudez and Lindemann-Matthies, 2020). The CBD defines “biodiversity” as

“the variability among living organisms from all sources including, inter alia, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species, between species and of ecosystems.” (United Nations, 1992, p. 3)

This definition draws attention to the multi-level aspects of biodiversity as an overarching concept, including the diversity within species (at the gene level), between species (at the species level), and of ecosystems/habitats (at the ecosystem/habitat level). Ecologists have expanded upon this definition to include additional components including the evenness of entities’ (genotypes, species, and ecosystems) (Hooper *et al.*, 2005) distribution, their interactions, and ecological dynamics and evolutionary processes (Hooper *et al.*, 2005; Levé *et al.*, 2019; Bermudez and Lindemann-Matthies, 2020). Landscape architects sometimes have broader and more abstract interpretations of biodiversity compared with ecologists, ranging from “all life expressions and needs” (Aponte, 2018) to “flora and fauna, of soil samples and climate data for forests, repairing ecological imbalances, and reconstructing preserves” (Sloan, 2018).

As a subset of the global biodiversity, urban biodiversity is distinctively different from that in other pristine ecosystems due to the unique physical and environmental characteristics in cities, where large populations dominated (Müller and Werner, 2010; Ignatieva *et al.*, 2023b). The understanding of urban

biodiversity can be different across global regions. European researchers tend to see urban biodiversity as the variety or richness of all life forms in and on the edge of cities (Müller, Werner and Kelcey, 2010). Urban biodiversity can be found in remnant native or semi-natural habitats, designed gardens/parks, and spontaneously appearing biotopes, such as wastelands and vacant lots with non-native species (Müller *et al.*, 2013; Ignatieva *et al.*, 2020). In the Southern Hemisphere, particularly in Australia and New Zealand, there is more attention to native species and habitats in and around cities, with the term “native biodiversity” introduced by New Zealand (Ignatieva *et al.*, 2020).

While “biodiversity” is a very complex term, in this study it is defined as the richness of flora and fauna species, and urban biodiversity is inclusively defined as the biodiversity within cities that encompasses both native and non-native components. The empirical investigation of public perceptions and preferences towards biodiversity in this study was in the context of urban parks. More specifically, in quantitative conjoint analysis, biodiversity was studied as an environmental aspect of parks, i.e. an attribute indicating species richness of flora and fauna. Species richness of flora and fauna is defined as the number of different species present (Hooper *et al.*, 2005). The study used it as an indicator of biodiversity in conjoint analysis for a variety of reasons. First, Phase I focus groups found participants’ mental constructs of the concept of biodiversity were more frequently associated with the richness of plant and animal species. Using terms phrased in the public's language is essential to increasing people's familiarity with some unfamiliar and complex concepts (e.g. biodiversity) (Bakhtiari *et al.*, 2014; Lima, 2016). Second, species richness has been used as a biodiversity indicator in previous ecological (Nielsen *et al.*, 2013) and social science studies (Qiu, Lindberg and Nielsen, 2013; Fischer *et al.*, 2018). Thirdly, it is argued that the species level of biodiversity matters and is critical for biodiversity conservation (Fischer *et al.*, 2018).

In terms of the qualitative methods for investigating the social dimension of biodiversity in parks, this research used focus groups and interviews to understand how people perceive the concept of biodiversity and its presence in urban parks by exploring mental constructs of biodiversity. Mental constructs refer to the knowledge, ideas, and beliefs that individuals held about a particular subject (Fischer and Young, 2007; Buijs *et al.*, 2008; Campbell-Arvai, 2019; Bernardo, Loupa-Ramos and Carvalheiro, 2021). Mental constructs provide a picture of how individuals understand a subject in their own words (Campbell-Arvai, 2019). Using this approach helps us to understand public views of biodiversity in their own social, cultural, and individual contexts without qualifying their knowledge as either “correct” or “incorrect” as compared with the scientific definition of biodiversity (Fischer and Young, 2007; Buijs *et al.*, 2008; Bernardo, Loupa-Ramos and Carvalheiro, 2021). Thus, in both focus groups and interviews, participants were encouraged to talk about their views and perceptions of biodiversity in their own words and they were not given a pre-defined concept of biodiversity.

1.5 Thesis structure

The thesis is organised in three parts (Figure 1.4). **Part I (Chapters 1, 2 and 3)** presents the introduction and literature review. **Chapter 1** is the introduction of this thesis. **Chapter 2** reviews the biodiversity-friendly approach to urban park design. First, the chapter reviews this issue in a broad global geographical context of Northern and Southern Hemisphere countries. Second, it elaborates the peculiarity of the Chinese context, including the unique Chinese park evolution, relevant UGS and biodiversity policies and city programmes, and the Chinese biodiversity-friendly park approach. This review defines traditional park and wild parks in the Chinese context and generates their typical characteristics. Third, to obtain a holistic picture of the biodiversity-friendly park approach, the

chapter explores relationships between some park characteristics/design measures and biodiversity richness. **Chapter 3** lays the theoretical foundation for this study. Drawing on different knowledge domains, including theories in environmental psychology, landscape aesthetics and ecological science, it describes theoretical perspectives for explaining landscape perception/preference, the importance of a pleasant/preferred landscape experience for both human and ecological health, and the potential disjuncture between ecology and aesthetics. The chapter then reviews existing empirical studies and methods relating to the social context of biodiverse UGSs and reveals that much work has been carried out in Western countries, whereas Chinese studies are scant and have yielded ambiguous results.

Part II (Chapters 4, 5, 6, 7) presents the main research aim and questions, the methodology and the results of each method, respectively. **Chapter 4** sets out the research questions and elaborates on the overall research methodology and process for empirical investigation. It first presents the selection of case study cities and the research as a mixed-method study. It then explains each research method used in terms of preparation and sampling, pilot testing, main data collection and data analysis. **Chapters 5, 6 and 7** present the results of focus groups, conjoint analysis and semi-structured interviews, respectively.

Finally, **Part III (Chapters 8 and 9)** consists of discussions, conclusions and their implications for practice. By gathering the results from different methods and comparing them with previous research, **Chapter 8** presents discussions for each research question. **Chapter 9** focuses on the key conclusions of this research, their implications for practices, and the limitations and future research.

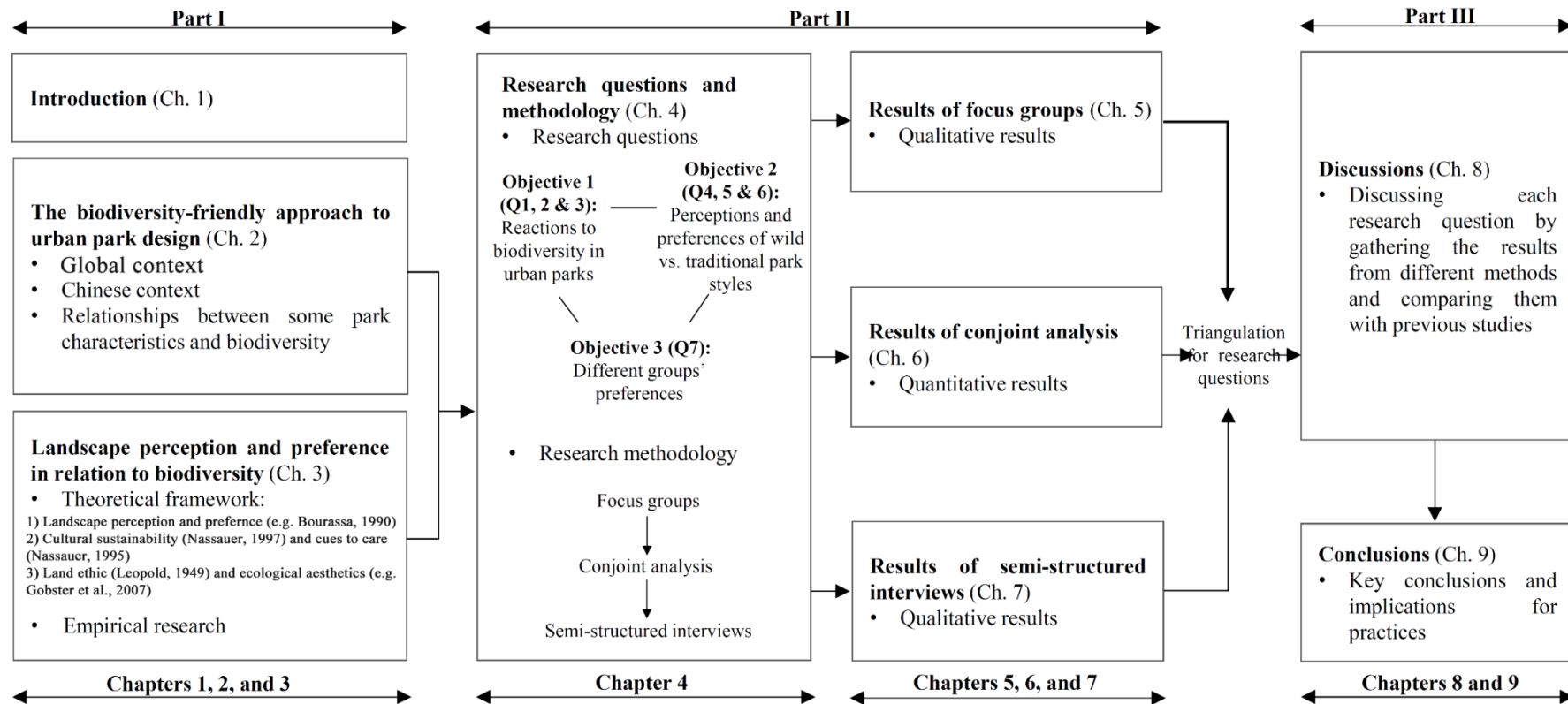


Figure 1.4 The structure of the thesis

Chapter 2: The biodiversity-friendly approach to urban park design

2.1 Introduction

Urban parks have evolved from primarily responding to public recreation and aesthetic needs to serving a more ecological role as an integral part of the broader urban BGI. This chapter reviews literature on the biodiversity-friendly approach to urban park design, covering a range of fields, including landscape architecture, urban ecology and plant ecology. The first section reviews concepts of biodiversity and urban biodiversity and their meanings in the literature (Section 2.2). Next, the chapter presents how these biodiversity-related concepts have been applied into urban park design and practices using examples from broad global geographical regions across the Northern (e.g. Europe and America) and Southern (e.g. Australia, New Zealand, and South Africa) Hemispheres (Section 2.3). The chapter then moves to the Chinese context to explore this country's own unique park evolution and the trajectory and peculiarity of the biodiversity-friendly park approach (Section 2.4). Finally, the chapter reviews studies on the relationships between several park characteristics and biodiversity (Section 2.5) to understand the effectiveness of some specific biodiversity-friendly measures. This is conducive to obtaining a deeper understanding and complete picture of the biodiversity-friendly park approach. This chapter intends to map out the existing research to establish an appropriate research background.

2.2 Concepts of biodiversity and urban biodiversity

The term “biodiversity” has its origin in North America with its initial expression as “biological diversity” used by T. Lovejoy in 1980, meaning the number of species (Lovejoy, 1980). E. Wilson is recognised as the scholar that “launched the word ‘biodiversity’ into the general use” (Harper and Hawksworth, 1994, p. 6), although Wilson acknowledged that W. Rosen introduced this term (Wilson and Peter, 1988). The Convention on Biological Diversity (CBD) (United Nations, 1992) highlights biodiversity as the variety at the gene, species, and ecosystem/habitat levels. Scientists have subsequently enriched the definition from the CBD to include other components (Table 2.1). However, species richness or species diversity is still commonly studied in many studies’ operational investigation (Qiu, Lindberg and Nielsen, 2013; Nielsen *et al.*, 2013), along with other variables such as beta diversity, species composition, etc. to characterise biodiversity (Bonthoux *et al.*, 2014).

Table 2.1 Examples of definitions of biodiversity provided by different scholars

Scholars	Definition
(Hooper <i>et al.</i> , 2005)	“Biodiversity can be described in terms of numbers of entities (how many genotypes, species, or ecosystems), the evenness of their distribution, the differences in their functional traits... and their interactions” (Hooper <i>et al.</i> , 2005, p. 5)
(Swingland, 2013)	“Species, genetic, and ecosystem diversity in an area, sometimes including associated abiotic components such as landscape features, drainage systems, and climate” (Swingland, 2013, p. 399)
(Houlden, Jani and Hong, 2021)	“Variety of flora and/or fauna” (Houlden, Jani and Hong, 2021, p. 2)

The discipline of urban ecology actively engages with the issue of urban biodiversity, which is different from biodiversity generally due to the distinct urban setting and constant human influences (Müller and Werner, 2010; Ignatieva *et al.*, 2023b). The small-scale, various habitat mosaic and the mix of native and non-native species in cities make urban biodiversity cosmopolitan. This is a very European understanding of urban biodiversity which is inclusive that consists of a mosaic of different habitats and native and non-native flora

and fauna (Müller, Werner and Kelcey, 2010). Müller *et al.* (2013) defined urban biodiversity as

“the variety or richness and abundance of living organisms (including genetic variation) and habitats found in and on the edge of human settlements... The following examples of habitats found in human settlements:

- *Remnant vegetation (e. g., remnant habitats of native plant communities, rock faces)*
- *Agricultural landscapes (e. g., meadows, arable land)*
- *Urban-industrial landscapes (e. g., wastelands and vacant lots, residential areas, industrial parks, railway areas, brownfields)*
- *Ornamental gardens and landscapes (e.g., formal parks and gardens, small gardens and green spaces).” (Müller et al., 2013, p. 125)*

Research of European urban ecology, which is associated with “Berlin School of Urban Ecology,” actively engages with urban vegetation and different successional stages on urban spontaneous habitats (Sukopp, 2002; Kowarik, 2018). In North America, some urban ecologists’ research is preoccupied by native species and remnant ecosystems (McKinney, 2002; Greenberg, 2008), while others view non-native and cultivated species, and spontaneous habitats as part of urban biodiversity and respect their cosmopolitan quality (Del Tredici, 2010; Gobster, 2012; Avolio *et al.*, 2020; Phillips and Lindquist, 2021). In Australia and New Zealand, the native component of flora and fauna is prioritised since these countries have experienced dramatic losses of native species due to the introduction and naturalisation of non-native species in urban development activities (Ignatieva *et al.*, 2020; Horsfall *et al.*, 2023).

Given different physical environmental conditions and socio-cultural development, interpretations of biodiversity and urban biodiversity between the aforementioned regions and China can differ. The term “biodiversity” was introduced to China in the late 1990s when China became one of the first parties to sign the CBD (Wang *et al.*, 2020). Most urban biodiversity research has focused on the species level (Yan and Yang, 2017; Gao *et al.*, 2019). Initial studies focused on plant species, whereas wildlife species tended to be ignored

(Huang, Liu and Li, 2015; Gan, 2021). While remnant native ecosystems and species have been strongly valued, cultivated plant species in formal parks and green spaces have also been regarded as part of urban biodiversity since Chinese have a tradition to utilize plants (Kong, 2011). Influenced by thoughts from European and Anglo-American areas, urban spontaneous vegetation (USV) (Li *et al.*, 2019a; Cheng *et al.*, 2022) that can be found in abandoned sites (Zhang *et al.*, 2021), unmanaged watersides (Li *et al.*, 2022), city walls (Chen, 2020), etc. has been receiving increasing attention as an essential aspect of urban biodiversity in recent years.

Despite scholar understandings of urban biodiversity differ in various regions, most policies tend to use the term “biodiversity” to refer more to the native component, and in relevant Chinese policies, it is also linked with certain valuable key species. For example, the *National Urban Ecological Conservation and Planning (2015-2020)* from China (MOHURD and MEE, 2016) highlights the restoration of native plant communities is a core focus in Chinese urban biodiversity conservation, along with the investigation and protection of threatened species and old valuable heritage trees.

The review of the concepts indicates that urban biodiversity is a complex and heterogeneous phenomenon and there is an absence of a universally agreed definition. As indicated in Introduction, in this study, biodiversity refers to the richness of flora and fauna species, and urban biodiversity is inclusively defined as the biodiversity within cities, without dividing its native and non-native components.

2.3 The biodiversity-friendly approach to urban park design

This thesis defines urban parks in an inclusive way, based on the definition by Konijnendijk *et al.* (2013). An inclusive definition is helpful for reflecting the constantly evolving role and physical form/style of urban public parks from the 19th to 21st centuries. Konijnendijk *et al.* (2013) defined urban parks as:

“delineated open space areas, mostly dominated by vegetation and water, and generally reserved for public use. Urban parks are mostly larger, but can also have the shape of smaller ‘pocket parks.’ Urban parks are usually locally defined (by authorities) as parks.” (Konijnendijk et al., 2013, p. 2)

2.3.1 The evolution of urban parks

In Europe, royal hunting preserves and private grounds were the antecedents of the urban public parks that first emerged in the 19th century in the UK (Spirn, 1984). According to Spirn:

“The word ‘park,’ in its original sense, referred to an enclosed tract of land held by royal grant for keeping beasts of the chase. It was later extended to represent the ornamental woodland and pasture around the country house used for recreation and for keeping deer.” (Spirn, 1984, p. 182)

In the UK, the 18th century Picturesque movement contributed to the picturesque design of private grounds of the landed gentry. The picturesque design advocated a pastoral landscape aesthetic that emulated the idealised nature that appeared in landscape paintings of Poussin, Lorrain and Rosa (Andrews, 1989). This picturesque style, which had also found expression in royal hunting preserves, typically featured extensive, well-mown grass with clumps of trees (Ignatieva, 2021).

It was only after the awareness of the public health risks of overcrowding in cities and outbreaks of pandemic diseases that royal hunting preserves and private grounds were opened up and became available to the public (Lima, 2016). In the 19th century, public parks were seen as places for escaping from overcrowded cities and going back to nature, and they were recognised as a

means of improving public health (Ward Thompson, 1998). Some new public parks were created, such as Birkenhead Park and Central Park. They used the pre-existing artistic-oriented pastoral, picturesque approach, yet they functioned with a new social agenda, namely, urban public environments (Ward Thompson, 1998; Lima, 2016). Victorian Gardenesque elements such as flowerbeds, formal plantings, neat lawns and horticultural displays with exotic species collected from several parts of the world were also incorporated into parks (Ignatieva, 2021). The picturesque-gardenesque park model that features manicured lawns with scattered ornamental trees and flowerbeds, which has been accepted by Europe and America, has been imitated in other geographically and culturally distinct regions, such as New Zealand, Australia, South Africa (Ignatieva, 2010), and Singapore (Khew, Yokohari and Tanaka, 2014) where landscape images and plants were introduced by colonists from the “motherland.” In the early 20th century, recreation facilities and attractions, sports grounds, play facilities for children and similar elements were introduced into parks (Cranz and Boland, 2004). Accompanied by the development of high-density high-rise housing after World War II, parks and green spaces in many European new town landscapes were uniformly designed as open parklands with well-mown lawns scattered with trees (Ruff, 1979; Jorgensen, 2004). Meanwhile, a decline of urban parks was detected, especially in the UK. Limited financial support posed challenges for local authorities to manage existing parks and build new ones.

Since the late 20th century, environmental problems and their impacts on human and ecological health have become more noticeable, resulting in broad environmental concerns and awareness. This has led to the promotion of the environmental movement, environmental philosophy and ecological-based landscape planning and design. Cranz and Boland (2004) identified that in the late 1990s, a new type of American park focusing on solutions to urban

ecological problems emerged. These parks largely involved the use of native plants, ecological and biodiversity restoration, and industrial land reclamation. In Europe, the development of urban ecology brought attention to urban nature conservation that advocated bringing nature into cities. Urban park design in the Netherlands, UK and Germany involved the use of the ecological approach or naturalistic style (Ruff, 1979).

In the 21st century, the role of urban parks in response to contemporary environmental challenges, such as biodiversity loss, climate change, flooding and urban heat islands, is increasingly emphasised. Parks are seen as an essential part of urban BGI to enhance both ecological and human health (Ward Thompson, 2002). Nature is a significant theme in designing 21st century parks, and creating more natural landscapes in cities is seen as a way to conserve biodiversity, improve the quality of the urban environment and reconnect people to nature. This 21st century view of nature, informed by ecology and biodiversity, is quite different from the 19th century view that had more cultural connotations with conventions of the picturesque (Ward Thompson, 1998; Tate, 2018; Kohout and Kopp, 2020).

2.3.2 Biodiversity as a core aim in urban park design

The brief overview of urban park evolution reveals the gradually stronger ecological concerns in park design, with increased input from ecology. This section presents the emphasis on biodiversity in parks in detail, including the background of introducing biodiversity into parks and the biodiversity-friendly approach to park design.

2.3.2.1 Background of introducing biodiversity into urban park design

While the late 20th century saw a growing concern for biodiversity in urban park design, there were earlier cases of parks that embraced ecological considerations. Some scholars argued that ecological considerations can be traced back to Frederick Law Olmsted's parks, for example, the Fens (O'Hara, 2018) and the Dutch *Instructive Parks* and *Heemparks* (Ruff, 1979; Kendle and Forbes, 1997). Today, many traditional historic parks (built in the 19th and early 20th centuries) are often used for recreational and ornamental purposes. They can also support urban biodiversity, since relics of historic landscapes have been integrated there, which could result in biodiverse habitats (Cornelis and Hermy, 2004).

Since the late 20th century, there have been multiple contributing factors in the background that significantly brought the biodiversity dimension into park practices, and biodiversity conservation/enhancement has risen as a core aim in some park designs. This thesis summarises three main factors, as outlined below.

(1) Biodiversity loss and awareness of the values of biodiversity

There is growing concern about the loss of biodiversity (United Nations, 1992). At the same time, multiple values of biodiversity are recognised. For cities, biodiversity delivers a broad spectrum of values (Keniger *et al.*, 2013), ranging from ecological (benefits to nature) to human-centred (benefits to humans) dimensions (Table 2.2; Dearborn and Kark, 2010). The controversy between the values of biodiversity and its loss has triggered increased biodiversity concerns in urban park design.

Table 2.2 Major motivations and benefits associated with urban biodiversity conservation (Dearborn and Kark, 2010)

Major motivations and benefits associated with urban biodiversity conservation	
Benefits to nature	1. Preserving local biodiversity in an urbanising environment and protecting important populations or rare species 2. Creating stepping stones or corridors for natural populations 3. Understanding and facilitating species' responses to environmental changes 4. Connecting people with nature and providing environmental education 5. Providing ecosystem services 6. Fulfilling ethical responsibilities
Benefits to humans	7. Improving human well-being



(2) Alienation between people and nature in cities

The industrial revolution has caused increased urbanisation and the decline of natural areas. The World Wildlife Fund's (WWF) *Living Planet Report (2018)* (WWF, 2018) reported the explosive growth of urban population, economic growth and infrastructure development since the 1950s, along with the increased tropical forest loss, domesticated land and ecosystem degradation (Figure 2.1). The alienation between people and nature in everyday lives has increased (Ozguner and Kendle, 2006). In cities, nature is limited to municipal, manicured parkland dominated by lawns, playgrounds and ballfields, while the survival of wild flora and fauna is threatened.

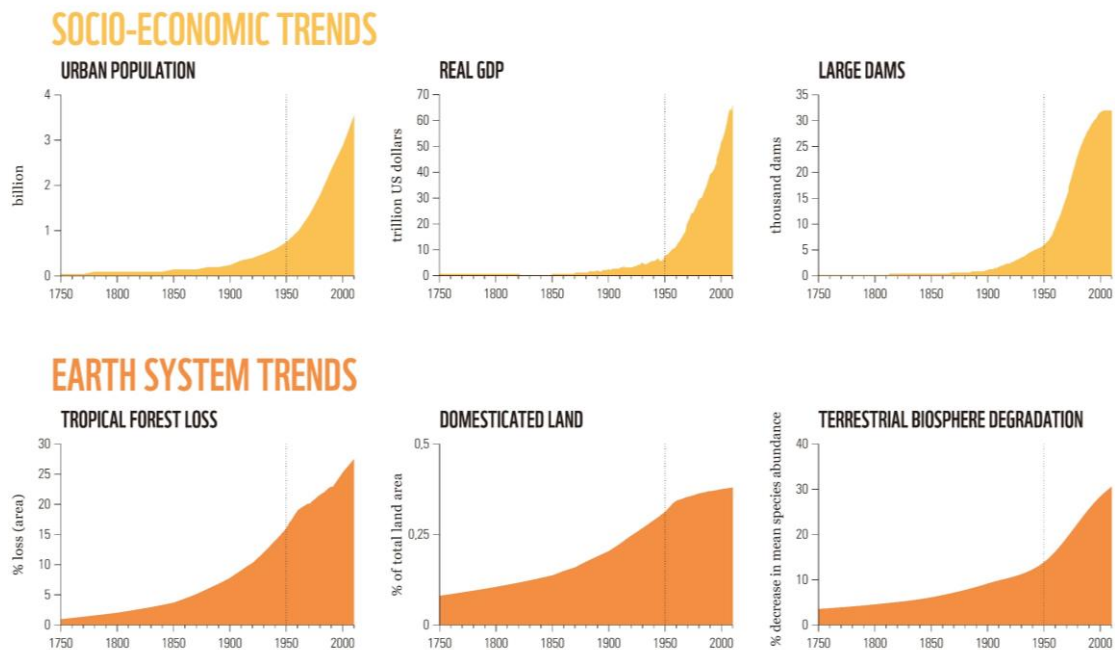


Figure 2.1 Socio-economic trends (urban population, real GDP, large dams) and earth life-supporting system trends (tropical forest loss, domesticated land and terrestrial biosphere degradation) from 1750 to 2015. The 1950s marks an explosion in growth of human activities (WWF, 2018). Graphs are originally from Steffen *et al.* (2015)

In the meantime, diverse benefits of urban nature have been identified. Urban nature provides ecosystem services, such as microclimate regulation, stormwater management and flood control (Haase *et al.*, 2014). Urban nature also offers cultural ecosystem services (Milcu *et al.*, 2013), that is, non-material benefits (e.g. spiritual, aesthetic and recreational benefits) people obtain from ecosystems, which may contribute to human health and well-being (Kosanic and Petzold, 2020). Landscape designers believe it is important to create parks and green spaces to bring more natural, biodiverse areas into cities, where residents can benefit from.

(3) Development of urban ecology and environmental philosophy

When the discipline of urban ecology emerged in the 1970s, ecologists have involved in landscape planning and design. For example, ecologist Sukopp influenced Berlin's UGS planning and design, supporting *Greening Berlin* as a

co-production of science, politics, and urban nature (Lachmund, 2013). Landscape designers have gradually become aware of working with urban nature. Notable among them is McHarg (1969), with his book *Design with Nature*. Another is Fairbrother (1970), whose book *New Lives, New Landscapes* provides a new ecological approach to urban planning and design. The rise of the environmental philosophy concerning the moral status of flora and fauna species can be detected since around the mid-20th century. Related notions include land ethic (Leopold, 1949) and ecological aesthetics (Gobster *et al.*, 2007). These notions expand the aesthetic scope to include *unscenic* but biodiverse landscapes (Saito, 1998) that deserve conservation and restoration. These notions will be discussed in detail in Chapter 3 (Section 3.3.2).

2.3.2.2 Biodiversity-friendly approach to urban park design

As for practices, a variety of biodiversity-friendly design theories and strategies have emerged (Table 2.3). These theories and strategies are diverse, and their implementation is flexible based on designers' ecological knowledge and the site's specific biotic, ecological and climatic conditions (Ignatieva, 2017). According to the characteristics of the designed/produced landscape itself, they can be categorised as two typologies: the wildness strategy and the formal strategy (Table 2.3).

A landscape designed with the wildness strategy tends to have wilderness-like, informal character. The meaning of "wildness" in this strategy refers to the process by which ecosystems are developed – with ecological, natural succession but not precluding human interventions (e.g. guiding and maintaining plant succession to support species conservation). Human control over the form of the plant communities is relinquished to some degree. The dynamic natural succession of ecosystems is a key, integral part of the design and maintenance. Intensive maintenance practices, such as frequent mowing, vegetation control and pesticide use, are intended to be avoided.

Table 2.3 Strategies of biodiversity-friendly design (summarised by the author)

	Wildness strategy	Formal strategy
Key content	- Designed landscape has wilderness-like, informal character. - Respect and restore natural habitats, ecosystems and processes. - Site planning, planting design and management are mainly driven by an awareness of natural processes and succession.	- Designed landscape has ordered and formal appearance. - Plantings exhibiting the traditional formality through layout still have the potential to serve biodiversity and ecological purposes.
Related strategies	- Conservation. - Rewilding (Jorgensen and Keenan, 2012; Kowarik, 2018) and the use of spontaneous vegetation (Kühn, 2006). - The use of native species (Cranz and Boland, 2004). - Biodiversinesque style (Ignatieva, 2018) and naturalistic/ecological plantings (Dunnett and Hitchmough, 2004).	- Non-naturalistic ecological woodland plantings (contemporary cases are rare, but they can be found in historic traditional parks). - Non-naturalistic herbaceous plantings, for example, Piet Oudolf's more formal plantings.
Example	 Natur Park Südgelände (https://gruen-berlin.de/en/)	 Private garden Boon in the Netherlands, designed by Piet Oudolf (https://oudolf.com/garden/boon)

The landscape designed by the formal strategy tends to have an ordered and formal appearance. Some scholars believe plantings imparting the traditional formality through layout and context, for example, non-naturalistic ecological woodland or herbaceous plantings, still have the potential to serve biodiversity purposes (Jorgensen, 2004). For instance, Piet Oudolf's gardens involve non-

naturalistic ecological herbaceous planting, and it is possible that they serve as wildlife habitats (Table 2.3). Hedged vegetated bosquets in French formal historical parks also provide important habitats for urban flora and fauna (Ignatieva, 2021).

2.3.3 Wild park style for supporting biodiversity

Several landscape/ecology professionals have shown an interest in the wildness strategy and have developed related design approaches, although not all these professionals explicitly label them as wildness strategies. Following is an overview of these approaches and projects according to the categories of ecosystem conservation, ecosystem restoration and rewilding, and ecosystem construction, using examples from Europe, America, Singapore, Australia, New Zealand and South Africa.

2.3.3.1 *Ecosystem conservation*

When projects are created on existing urban ecosystems where high biodiversity can be found, attempts are often made to conserve what is already there. As “integrated human-ecological phenomena” (Alberti, 2008, p. 6), urban ecosystems are highly complex, heterogenous and dynamic, and they are subjected to varying degrees of human impact (Kowarik, 2018). This makes them different from natural ecosystems in many aspects, including soil, climate, hydrology and species assemblages (Alberti, 2008). Cities usually harbour a mosaic of fragmented ecosystems that differ in transformation stages from pristine to novel conditions impacted by humans to varying degrees (Kowarik, 2011). Kowarik developed the Four Natures approach (Kowarik, 2005; 2011; 2018) to conceptualise four major types of urban ecosystems that reflect different human-mediated transformation stages (Figure 2.2).

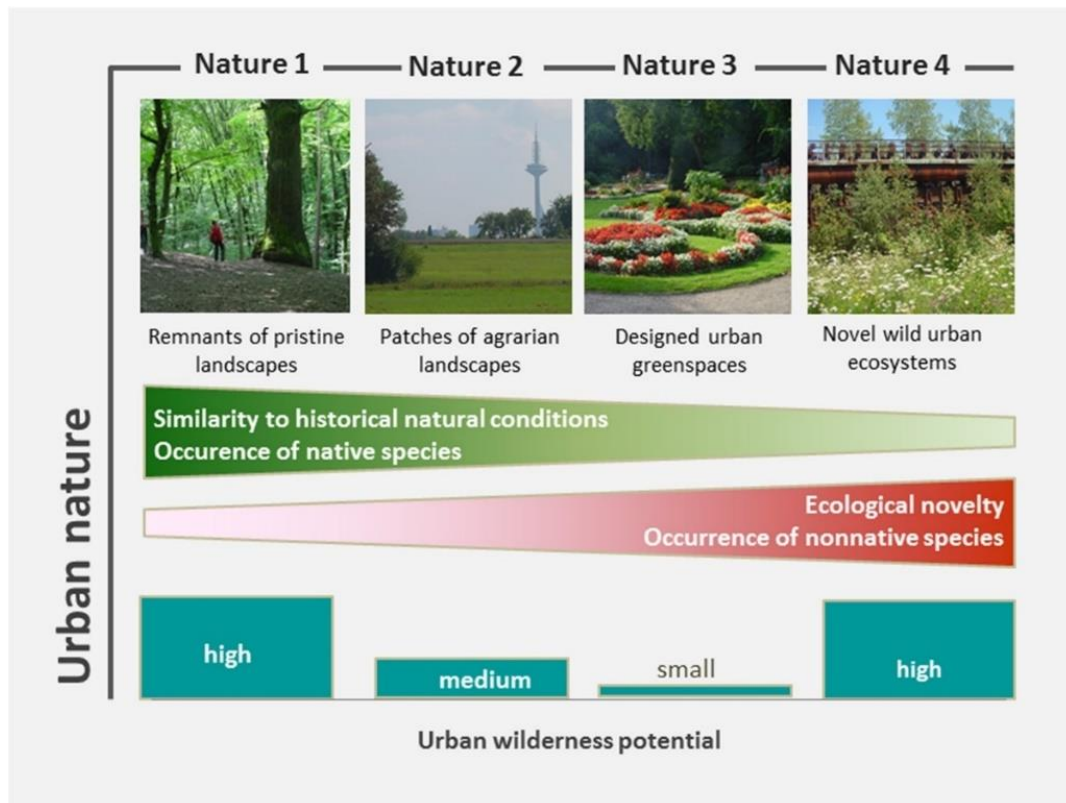


Figure 2.2 The Four Natures approach (Kowarik, 2005; 2011; 2018) differentiates the major types of urban ecosystems that differ in transformation stages from pristine to novel conditions (Kowarik, 2018)

Conservation of Nature 1 and Nature 2 is recognised by urban conservation agendas, and they are believed to harbour more native and endangered forest and grassland species compared with other nature types (Kowarik, 2011). Conservation of urban remnant native ecosystems is highlighted by many cities' large-scale urban planning. For example, biodiversity conservation alliance Chicago Wilderness is committed to the conservation and management of various natural ecosystems in the Chicago region (Heneghan *et al.*, 2013). Cape Town, South Africa, has proposed the systematic conservation plan of the city's rich biodiversity (situated in Cape Floristic Region global biodiversity hotspot) and a wide range of natural vegetation communities including fynbos, renosterveld, strandveld (including thicket), wetlands, and forests (also known as the Biodiversity Network) (City of Cape Town, 2019). Conservation of remnant native urban ecosystems is a priority in Australia's "native biodiversity"

agenda, as reviewed in section 2.2. Remnant native bushlands and forests in and around Australian cities (e.g. Canberra) are strongly valued for conservation due to not only their biodiversity and ecological value but also symbolic value in representing Australia's national identity (Ignatieva *et al.*, 2023a; Mofrad, 2023). Biophilic urban design guidelines are developed (e.g. *Start with the grasslands (SWTG)* by The Victorian National Parks Association) to conserve natural grasslands in Melbourne (Marshall and Williams, 2019) and in Melbourne's urban parks (e.g. Royal Park) (Instone, 2010).

It is increasingly acknowledged that Nature 4 (where non-native species can be common) (Gandy, 2013b; Unt, Travlou and Bell, 2014) should be added to urban conservation agendas, since it can harbour many species (Bonthoux *et al.*, 2014), and

“areas with novel urban nature are often located close to urban people. Nature 4 areas also allow access to the wilderness experience in regions where ancient wilderness has been lost due to urbanization or intensive agriculture.”
(Kowarik, 2018, p. 342)

In Berlin, several novel wild ecosystems (Nature 4) have been conserved as urban nature parks and have been integrated into urban green infrastructure. These parks support local biodiversity and offer residents accessible wild nature experiences (Figure 2.3). Inclusion of Nature 4 as a part of urban green infrastructure is now receiving attention in Europe, notably in Berlin, but it has received limited interest in Australia probably because Nature 4 (with the domination of non-native species) is not considered as ideal “nature” in Australian context (native ecosystems such as bushlands are considered ideal “nature” in Australian context) that deserves conservation in their own right (Ignatieva *et al.*, 2023a).



(a) Natur-Park Südgelände



(b) Park am Gleisdreieck

Figure 2.3 Nature 4 conserved as parks and integrated into Berlin's urban green infrastructure (<https://gruen-berlin.de/en/>)

2.3.3.2 Ecosystem restoration and rewilding

Cities also contain many sites where ecosystems have been damaged or degraded. Ecological restoration is conducive to assisting their recovery towards a healthier, more biodiverse and structurally more complex state. Classical ecological restoration approaches that make reference to an earlier stand of native species assemblages established in the same region historically (i.e. the retrospective perspective) (Kowarik, 2005) are often applied to the restoration of lost native ecosystems, for example, within the restoration of lost urban native grasslands, wetlands, or other remnants in Australia (Marshall and Williams, 2019). However, classical restoration strategies have received critiques in terms of whether it is possible/realistic to return such disturbed ecosystems to their previous native state (Hobbs *et al.*, 2006), especially in the urban setting with a large number of non-native species.

There is an increasing focus on rewilding as another ecological restoration measure. Rewilding advocates replacing human intervention with natural succession (Navarro and Pereira, 2012; Corlett, 2016). Rewilding stands on a more prospective perspective that recognises a site's potential for self-organisation in ecosystems' natural *processes* rather than idealised, *picture* of nature (Kowarik, 2005), compared with the retrospective classical perspective. Though the research on rewilding is usually concentrated in the rural ecosystem, it has become an important measure for urban parks to improve biodiversity, especially through the use of urban spontaneous vegetation (USV) (Kühn, 2006). USV is able to support biodiversity, express local identity, and remove air pollutants, and it is cost/resource-effective (Del Tredici, 2010; Sikorska *et al.*, 2021). In Singapore, there is a Urban Wild Initiative (led by National University of Singapore) that advocates rewilding urban parks with USV and less-manicured maintenance to enhance biodiversity and to offer a cost/resource-effective alternative to the dominated manicured lawn urban landscapes (Hwang, Yue and Tan, 2017; Hwang and Yue, 2019). The idea for most of Gilles Clément's work (Clément, 1985), such as Derborence Island in Parc Henri Matissein (Figure 2.4), is primarily derived from the aesthetic and symbolic characteristics of USV and the conservation/enhancement of biodiversity (Gandy, 2013a). In shrinking regions of Germany, for example, in the Ruhr, large-scale post-industrial sites have experienced natural succession and rewilding now known as "industrial forests" (Dettmar, 2005) and other areas now part of Landschaftspark Duisburg-Nord designed by Peter Latz. Nevertheless, the rewilding approach may not be feasible in Southern Hemisphere, e.g. in Australia or New Zealand, since exotic species make up the majority of the soil banks of these countries' urban environments, and their urban ecosystems are vulnerable to many introduced exotic species (Ignatieva, 2010).



Figure 2.4 Derborence Island in Parc Henri Matisse is inaccessible, surrounded by concrete walls where spontaneous forests are growing inside (https://www.flickr.com/photos/julian_raxworthy/7316723070/in/photostream/)

2.3.3.3 *Ecosystem construction*

Attempts are made to create more natural, wild-looking ecosystems to enhance urban biodiversity, of which planting is a core focus. Some urban park projects involve the use of naturalistic planting as an alternative to conventional lawns and flowerbeds. Naturalistic planting has also been used in the ecological woodland framework in the residential landscapes of Birchwood, Warrington, UK (Jorgensen, 2004). The dynamic quality of natural succession is an integral part of naturalistic planting, and it is often very natural and wild to look at. Naturalistic planting initially focused on the use of native plants (Kendle and Forbes, 1997). Interest has been shown in the combination of native and exotic species to enhance planting's aesthetic quality and acceptance by the public (Dunnett and Hitchmough, 2004).

Introducing urban lawn alternatives has been discussed in different countries. While lawns contribute to ecosystem services (e.g. aesthetic, recreation, carbon sequestration, etc.), their ecological value has been increasingly questioned because they are typically homogenous in terms of species

richness and composition, and they pose negative environmental impacts (e.g. intensive water use, greenhouse gas emission, etc.) (Robbins and Sharp, 2003). Different lawn alternatives have been established in some European countries' parks and green spaces, for example, native meadows (i.e. infrequently mown native grasslands), grass-free lawns (i.e. mowing-tolerant clonal perennial forbs), and pictorial meadows (meadows with annuals) in Sweden and the UK (e.g. Queen Elizabeth Olympic Park) (Dunnett and Hitchmough, 2004; Smith and Fellowes, 2015; Southon *et al.*, 2017; Ignatieva *et al.*, 2020). Lawn alternatives used in American parks mainly include native prairie planting (e.g. Lurie Garden in Millennium Park), native meadows (e.g. Summit Field in Louisville's Park System), rainwater garden and wetland planting, and flowering bee lawns (Cranz and Boland, 2004; Ramer and Nelson, 2020).

In the Southern Hemisphere of Potchefstroom, South Africa, urban agriculture has been seen as a way to increase biodiversity and contribute to livelihoods. The eco-circle approach of urban agriculture has been employed, wherein vegetables are grown in clustered, small circles surrounded by ruderal vegetation (Cilliers, 2010). In Australia and New Zealand, design with native plants is a core part in planting to increase urban biodiversity. The two countries have developed their own stormwater management practices with rainwater gardens, swales, etc. using native, indigenous species and drought-tolerant plants (Ignatieva *et al.*, 2020). This creates relatively wild-looking urban landscapes that resemble the indigenous remnants and contrast with the dominant manicured parklands with large-scale lawns.

Other relevant concepts in relation to the biodiversity-friendly wildness strategy include urban forest and the recent Nature-based Solutions (NbS). Urban forest emphasises conserving, establishing and managing urban woodlands, trees and associated vegetation (Konijnendijk *et al.*, 2006). More recently, NbS have

drawn academic attention (Cohen-Shacham *et al.*, 2016; Kabisch, Frantzeskaki and Hansen, 2022) for their potential to address/mitigate complex environmental challenges. NbS refer to broad solutions that “are inspired and supported by nature, which are cost-effective” (European Commission, 2015).

In summary, urban parks built with the above-mentioned biodiversity-friendly wildness strategy often have a wild-looking, less manicured and informal character. Such parks represent a novel park style alternative to traditional, ornamental parks. In this thesis, they are called urban wild parks, and their style is described as the wild style. The main idea of wild park practices is ecologically driven, with an emphasis on the biodiversity-friendly vision; however, they also involve the provision of other ecosystem services for humans (Milcu *et al.*, 2013; Fisher and Brown, 2014), including nature experience and outdoor recreation.

2.4 The Chinese context in relation to urban parks and the biodiversity-friendly approach

This section aims to present the Chinese context for the biodiversity-friendly approach to urban park design, including an overview of Chinese urban park evolution (and a review of classical gardens), the rise of biodiversity concerns in Chinese urban parks, policies and programmes associated with urban biodiversity, and Chinese biodiversity-friendly design approaches and practices.

2.4.1 Chinese classical gardens

In ancient China (before 1840), classical gardens were the dominant type of UGSs, but they were only available to emperors or elites. The design of

classical gardens is rooted in the Chinese traditional philosophy of *oneness with nature*, asserting that humans and nature are a part of an integrated whole and that humans should respect and follow the rhythms of nature to develop a harmonious, mutual friendship with nature. With *oneness with nature*, classical gardens pursue a nature-like form with the predominant elements of mountains and water, which conceptualise the idea of nature in ancient China (Ji and Chen, 1988). Gardening adopts the basic mountain-and-water design pattern (Zhao, 2008) to emulate and represent nature at an intimate scale by using rocks and stones as mountains and creating ponds or lakes as water.¹ In a walled, enclosed environment, rockery and water structure the garden, along with plants and architecture. All these elements are linked by winding paths and bridges to deliver a sense of infinity within the boundaries of enclosure.

The aesthetic idea of pictorial flavour is a fundamental characteristic of classical gardens (Zhao, 2008), which manifests the close relationship between gardens and landscape paintings in ancient China. Gardening tries to imitate the romantic and poetic nature in landscape paintings by using various design techniques, such as scene-making, scene-manipulation (e.g. framing scenes, borrowing scenes), contrast and foil (Padua, 2010). Several scholars have studied the pictorial tradition in Chinese gardens and compared it to the Britain picturesque tradition (Guan, 2016; Guan and Zhu, 2016; Gu, 2016).

Some scholars argued that classical gardening also embraces ecological consciousness to some degree (Chen and Wu, 2009; Yang *et al.*, 2019a). The philosophical underpinning of *oneness with nature* guides classical gardening to respect, follow and appropriately take advantage of natural resources and processes. For example, ponds or lakes are usually located within the existing low-lying areas with water accumulation. On-site old trees or old-growth forests

¹ Representing nature at an intimate scale in gardens is especially true for scholar gardens, i.e. gardens designed by scholar-officials or literati. Scholar gardens are usually smaller in scale than royal gardens.

are protected. Gardening encourages the use of native plant species, which is respected because they require resource-saving and eco-friendly maintenance (Yang *et al.*, 2019a). Pruning plants into geometric shapes is rare, and USV is allowed to grow in certain areas (Figure 2.5). Manicured lawns are hardly used because their formality and openness seem exotic in nature-like and enclosed classical gardens (especially in scholar gardens). Instead, groundcovers, for example, *O. japonicas* and herb lilyturf (*Ophiopogon bodinieri*), are used according to their ecological character (Yang *et al.*, 2019a).



Figure 2.5 Spontaneous vegetation on rocks (photographed by the author)

Classical gardens were private gardens for the royal families and elites until China overthrew the monarchy and experienced dramatic political and social changes during the late Qing and Republican periods (1840–1949). The concept of the public park, as a Western idea, was imported to China, and modern public parks dominated by large-scale lawns, flowerbeds, recreation facilities and open squares have started to occupy Chinese UGSs. Such modern parks generally cast aside the classical approach in favour of the recreation needs of the masses and to decorate and match with contemporary Chinese cityscapes (Zhu and Yang, 2005; Chen, 2013). The mountain-and-

water approach is believed inadequate to meet contemporary social needs in terms of active recreation, for example, sports and entertainment activities (Zhu and Yang, 2005): classical gardens are “an enclosed landscape where a winding path led to a secluded, quiet place” (Yang *et al.*, 2019a, p. 10) where flat, open spaces for active usage are scarce.

Nevertheless, there are some modern parks built before the 1978 Economic Reform that partly inherit classical conventions. These parks organise Chinese and Western garden traditions in one park environment, which is known as the *Garden within Garden* strategy (Zhao, 2008): the Western garden tradition is reflected as large, open spaces (e.g. lawns or squares) where people can have recreation activities, and the Chinese one is planned as quiet resting zones by adopting the mountain-and-water approach. Since the Economic Reform, classical heritage is implemented on a small scale, mostly by referencing garden elements (e.g. rocks, pavilions, plants such as bamboos and lotus flowers) rather than by adopting an overall mountain-and-water structure (Zhu and Yang, 2005).

2.4.2 Public parks and China’s City Beautification Movement

As mentioned before, the concept of the public park was imported to China during the late Qing and Republican periods (1840–1949), when the country partly became a Western colony. Western styled parks with lawns and recreation facilities were built in International Settlements² in cities such as Shanghai, Tianjin and Dalian. The trend of creating public parks influenced the national government and some Chinese capitalists, who started funding new parks for the masses (Chen, 2013). However, with China in the chaos of

² International settlements were geographically enclosed areas for foreigners to further commercial interests. They were created in Chinese cities during the semi-colonial and semi-feudal era in China (1840–1949).

external invasion and civil wars from 1840 to 1949, it was difficult to invest more money and put more effort in building parks. During the socialist Mao era (1949–1976), the Soviet Parks of Culture and Rest was promoted as a model for Chinese urban park design.

Since the 1980s, the City Beautification Movement (CBM) has begun in China against the backdrop of the start of urbanisation and westernisation due to the 1978 Economic Reform. Within the wave of CBM, a building boom of urban parks, plazas and avenues has occurred, along with the dramatically increased rate of urbanisation. In 1981, there were 694 parks totalling 14,739 ha, whereas at the end of 2014, China had 13,074 parks totalling 367,962 ha (Wang and Liu, 2017). Parks are perceived as a tool for CBM: creating the representative clean and favourable urban landscape image to attract more economic investment and stimulate regional growth³ in the process of urban expansion and sprawl as well as meeting increasing public recreation demands. With the extensive construction of parks, primarily their ornamental and recreational functions have been emphasised and widely promoted (Chen and Li, 2021). Yu and Padua (2007) described this utilitarian-oriented urban landscape development as a *cosmetic urban fever*.

Lawns, flowerbeds and exotic plant species have gained favoured in many Chinese urban park projects (Figure 2.6). City administrators travelled abroad to study the lessons of western urban development, and it was manicured lawns, flowerbeds, and exotic plants that impressed these Chinese officials (Chen, 2013). Such landscape elements are then replicated in China. In 11 cities in the Yangtze River Delta, 25% of the tree species are exotic, non-native species (Qian *et al.*, 2016). In 2010, 53% of Beijing's urban plants were exotic species

³ This is stronger since 2003, when real estate became one of the pillar industries of the national economy. Parks and green spaces are implemented to enhance land and real estate prices and spur real estate and commercial development (Wang, 2018).

(Zhao *et al.*, 2010). Figure 2.7 shows that the annual planted area of lawns in China increased dramatically from around 9,000 to 40,000 hectares from 1997 to 2013 (Yang *et al.*, 2019a). The use of lawns in parks is usually combined with emergent high trees without understorey or edge planting, forming a two-layered vegetation structure (Figure 2.6; Da and Song, 2008; Wang *et al.*, 2021). This way of planting is fast, and it is widely applied in Chinese urban parks. However, scholars claim that the vegetation structure of such planting is simple, which may contribute little to urban biodiversity (Da and Song, 2008; Wang *et al.*, 2021):

“The prevailing characteristics of vegetation structure are often homogeneous vegetation with two layers: short turf-grass lawns and high trees, typical of modern urban parks in China...” (Wang et al., 2021, p. 1)



Figure 2.6 Flowerbeds and lawns with emergent high trees (without understorey or edge planting) in Chinese urban parks (photographed by the author)

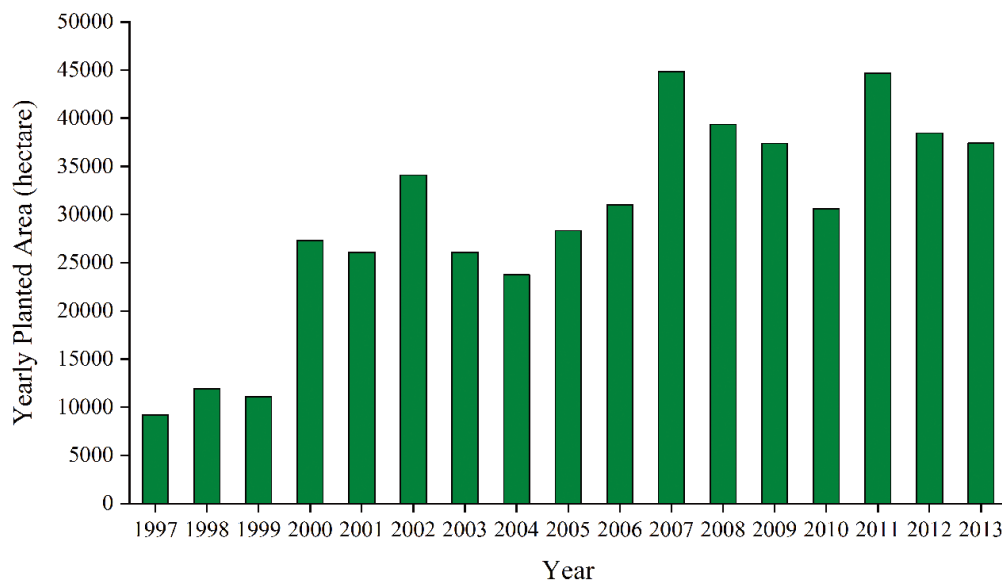


Figure 2.7 Annual planted area of lawns in China from 1997 to 2013 (Yang *et al.*, 2019a)

In response to increased public recreation needs, functional aspects have been highlighted in park design by incorporating hardscapes such as artificial, built recreation facilities and squares (Zhang and Zhang, 2002; Deng, 2003). Squares provide an open space where residents engage in activities such as dancing, Tai Chi and sword practice.

Today, most Chinese urban parks are dominated by lawns, flowerbeds, monoculture and hardscapes, and they serve predominantly recreational and ornamental functions. These parks require frequent intensive maintenance in terms of mowing, pruning, trimming, irrigating and applying of pesticide/herbicide/fertiliser to maintain their neat and ornamental appearance (Zhang and Zhang, 2002; Deng, 2003; Li *et al.*, 2019b). For example, Yang *et al.* (2019b) found that pesticides and fertilisers were applied in most of the studied 28 parks in Xi'an city, and park lawns were subjected to high maintenance compared to those in Europe, for example, in Paris (Bertoncini *et al.*, 2012) and Sweden (Ignatieva *et al.*, 2017).

This thesis defines urban parks in China where ornamental and recreational functions are primarily emphasised as Chinese traditional parks. Based on the literature review (e.g. Zhang and Zhang, 2002; Deng, 2003; Li *et al.*, 2019b; Wang *et al.*, 2021), the main characteristics of Chinese traditional parks are summarised in Table 2.4.

Table 2.4 Main characteristics of Chinese urban traditional parks

Chinese urban traditional parks	
Main function	Recreation, leisure, urban decoration, aiding economic growth, may contribute to ecological health to some extent.
Ecological/biodiversity value	Limited species (especially fauna) diversity, homogeneous habitats.
Maintenance	Intensively maintained in terms of mowing, trimming, pruning, frequent irrigation and pesticide/herbicide/fertiliser application. Parks appear neat, tidy and ordered.
Plantings	Ornamental plantings, flowerbeds, monoculture. Relatively homogenous habitats mainly consisting of manicured lawns scattered with single-tiered trees.
Facilities and infrastructures	Ample facilities, such as resting facilities, sanitation facilities and recreation and play facilities. Contain open spaces, such as squares, for residents' everyday activities.

2.4.3 The rise of biodiversity concerns in Chinese urban park design

While primarily the ornamental and recreational functions are emphasised as a focus in Chinese traditional park design, some important contributory factors have gradually brought the biodiversity dimension into Chinese urban park design since the late 1990s (Zhong, Yang and Xue, 2021). These driving factors do not exist in isolation and are often synergistic and interrelated.

2.4.3.1 Threats to urban biodiversity

China is one of the 12 recognised mega-biodiversity countries in the world,

having an extraordinary variety of plant and animal species and habitats (Xie *et al.*, 2015). However, China is also one of the countries that has suffered severe biodiversity loss during the past few decades (MEE, 2010). According to *Living Planet Report China* (Xie *et al.*, 2015), the index of population trends of forest ecosystem mammals decreased by 78% from 1970 to 2010 in China (Figure 2.8).

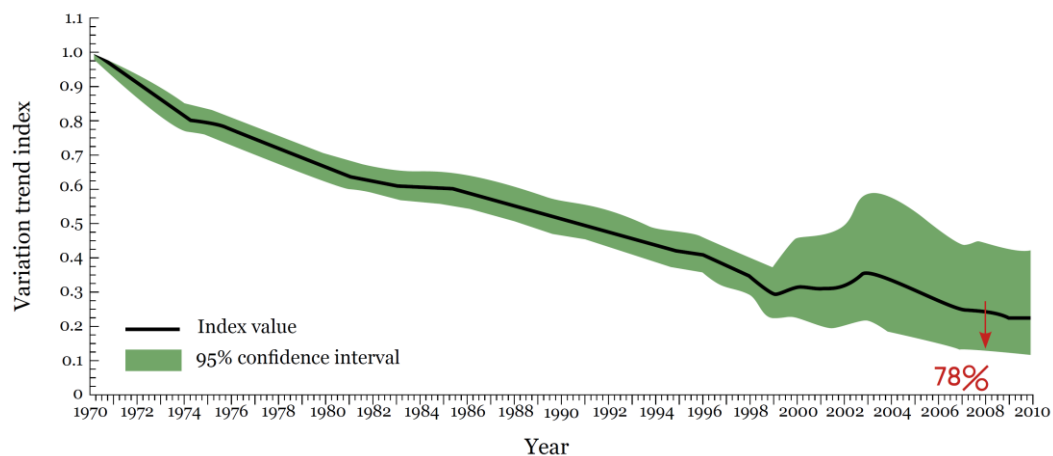


Figure 2.8 Index of population trends of forest ecosystem mammals (1970–2010) in China (Xie *et al.*, 2015)

During the process of urbanisation, large areas of urban natural habitats have been turned into impervious surfaces. For instance, in Kunming (Southwest China), the built-up area increased from 16% of the entire city area in 1992 to 43% in 2009, along with a decrease in the percentage of grass, agricultural and forest lands (Zhou and Wang, 2011). The research by ecologist Jing Gan at Tongji University (Gan, 2021) documented the transformation of a spontaneously developed biodiverse wetland habitat into the East Wing of the Shanghai Science and Technology Museum (Figure 2.9).



Figure 2.9 Transformation of a biodiverse wetland habitat into a museum in Shanghai. Left: Before the construction of the museum. Right: During the construction of the museum (EP, 2017)

2.4.3.2 Critics of the biodiversity value of urban traditional parks

The biodiversity value of Chinese traditional parks has been questioned; while they may harbour certain levels of biodiversity, a number of Chinese scholars indicate that their ability to support and promote richer biodiversity might be limited (Da and Song, 2008; Da and Guo, 2014; Wang *et al.*, 2021; Wang *et al.*, 2022). First, the high proportion of exotic plant species for ornamental purposes in traditional parks might threaten local native habitats and species. Second, the two-layered planting, i.e. short turfgrass lawns with single-tiered trees, used in Chinese traditional parks is quite simple in terms of structure and composition, which may limit its role in providing optimum habitat for insects and birds (Wang *et al.*, 2021; Wang *et al.*, 2022). Third, Chinese traditional parks require intensive maintenance and may cause more environmental problems through pollution from the chemicals used, heavy water use for irrigation and greenhouse gas emissions during mowing (Yang *et al.*, 2019a).

2.4.3.3 Disconnection from biodiverse nature in Chinese cities

In one international survey, 73% of mothers worldwide reported that their children preferred to explore nature, but only 5% of mothers in China said their children explored nature often (Singer *et al.*, 2009). Louv (2010) noted that humans, especially children, are spending less time experiencing outdoor

nature than they did in the past, and he described this phenomenon as *nature-deficit disorder*. Nature-deficit disorder may result in a wide range of problems, such as obesity, attention deficit disorder, depression and impaired social skills. Scholars pointed out that nature-deficit disorder has entered into China and applies not only to Chinese children but also to adults (Qiu, 2018).

Urbanisation has led to the expansion of impervious surfaces and buildings and, at the same time, the shrinkage of natural spaces in Chinese urban residents' daily life. China's new generation, i.e. those who were born after the 1980s and grew up in the era of Economic Reform intertwined with fast urbanisation and the rise of the Internet, might have limited direct experience with biodiverse natural habitats – whether in wild woods, in valleys and fields or along streams and lakes. Accordingly, Chinese landscape designers advocate creating more biodiverse parks to provide Chinese citizens with opportunities to embrace biodiverse nature without taking a long journey to the rural countryside (Wang and Liu, 2014; Yuan, 2021).

2.4.4 Policies and programmes relevant to urban biodiversity

Several national and local policies relating to urban biodiversity and urban greening have been launched in China in the past two decades (Table 2.5).

In 1994, China launched *National Action Plan for Biodiversity Conservation*. Since then, different policies and documents in relation to biodiversity have been developed. In 2012, *Ecological Civilisation Policy* was put forward as a national new urbanisation plan at the 18th National Congress of the Communist Party of China. *Ecological Civilisation* proposes *Ecology First, Green Development* and is conceptualised as the new paradigm guiding Chinese urban landscape development to mitigate environmental problems and impacts

arising from previous high-speed urbanisation (Chen and Li, 2021).

Table 2.5 Selected key policies (including strategies and action plans) for urban biodiversity in China (MSC = Ministry of State Council, MOHURD = Ministry of Housing and Urban-Rural Development of the People's Republic of China, MEE = Ministry of Ecology and Environment of the People's Republic of China, GBQTS = Guangzhou Bureau of Quality and Technical Supervision, SHMBEE = Shanghai Municipal Bureau of Ecology and Environment, SZMBEE = Shenzhen Municipal Bureau of Ecology and Environment)

Year	Policy/document	Launched by
<i>In relation to biodiversity: National level</i>		
1994	National Action Plan for Biodiversity Conservation	MEE
2008	National Outline Land Use Master Plan (2006–2020)	MSC
2012	Ecological Civilisation	The 18 th National Congress
2021	White Paper of Biodiversity Conservation in China	MSC
<i>In relation to urban biodiversity and urban greening: National level</i>		
2002	Outline of Urban Green Space System Planning (Pilot version)	MOHURD
2016	National Urban Ecological Conservation and Planning, 2015–2020	MEE & MOHURD
<i>In relation to urban biodiversity and urban greening: Local level</i>		
2009	Standards for Guangzhou Urban Park Planning and Design (DBJ440100/T23-2009)	GBQTS
2013	Shanghai Biodiversity Conservation Strategy and Action Plan (2012–2030)	SHMBEE
2021	Hangzhou Yuhang Biodiversity Conservation Strategy and Action Plan (2020–2022)	Hangzhou Yuhang Government
2022	Shenzhen Biodiversity Conservation Strategy and Action Plan (2022–2025)	SZMBEE

Several national UGS planning and design policies highlight the importance of urban biodiversity conservation. *National Urban Ecological Conservation and Planning 2015–2020* proposes the construction of an urban habitat network system by integrating urban nature reserves, scenic spots, country parks, urban parks and green corridors. On the local level, content on urban biodiversity conservation has been incorporated into several cities' urban master plan and urban green system plan, for example, *Beijing Urban Master Plan (2016–2035)*,

Shanghai Urban Master Plan (2017–2035) and *Hangzhou Green Space System Plan (2021–2035)*. In addition, several cities, such as Shanghai, Hangzhou and Shenzhen, announced their *Local Biodiversity Conservation Strategy and Action Plan* as the means by which the national biodiversity conservation concerns are transformed into local action.

Since 2000, the Chinese government has launched different programmes, for example, Forest City and Sponge City. More recently, these programmes have been promoted as NbS in China to reverse and avert urban environmental challenges, for example, urban flooding, biodiversity loss, air pollution and water contamination (Chen and Li, 2021).

In 2005, Forest City was officially proposed to help cities become more biodiverse and more ecologically resilient (SFGA, 2005). The core idea of Forest City is the establishment of urban forest networks by conserving, constructing and managing forest patches in cities to minimise habitat degradation and fragmentation during urbanisation (Wang, 2016; Chen and Li, 2021).

First established in 2014 and widely promoted in 2015, Sponge City is a response to urban flooding and stormwater issues in Chinese cities (Figure 2.10; MSC, 2015). Sponge City advocates that UGSs function as *urban sponges* to absorb, store, and purify water. Purified water can be repurposed for other uses (e.g. vegetation irrigation). In addition to stormwater management, biodiversity enhancement is regarded as another important goal of Sponge City (Yu *et al.*, 2015). Bioretention such as rainwater gardens, swales, wetlands and ponds are common landscape elements used in Sponge City projects, functioning as not only water reservoirs but also habitats in which flora and fauna species can coexist. Notably, USV instead of lawns has been promoted to create water

reservoirs and habitats (Li, 2016).

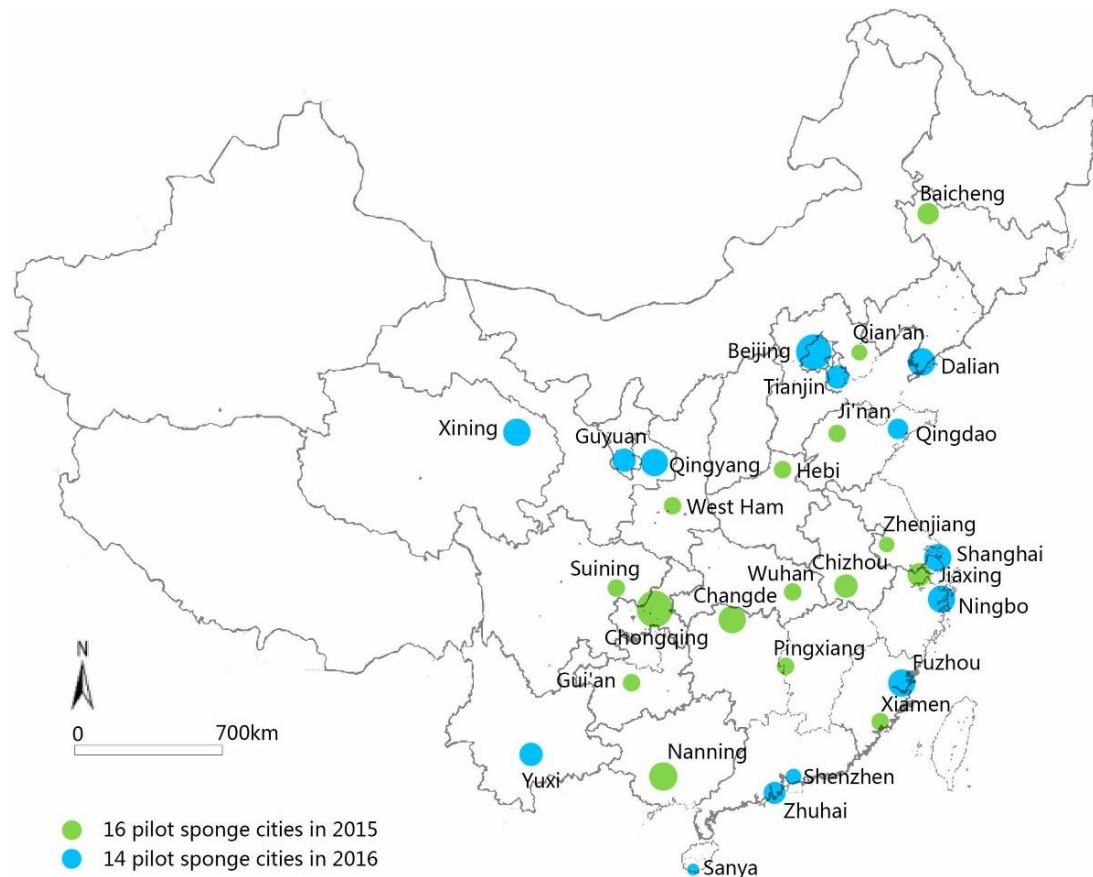


Figure 2.10 China's Sponge City programme: 16 cities were approved as pilot sponge cities in 2015; another 14 cities were included in the pilot programme in 2016 (Wang, 2018)

2.4.5 Wild park style in Chinese cities

Regarding smaller park design scale, ecological and biodiversity conservation/enhancement have been increasingly prioritised as a park design aim by some Chinese landscape designers, such as Kongjian Yu and Xiangrong Wang. This has promoted the rise of wild parks in Chinese cities. Some representative wild park projects in China, along with a discussion of their design strategies and characteristics, are reviewed here.

2.4.5.1 Ecosystem conservation

In China, urban ecosystem conservation is often aimed at pristine remnant habitats in and around cities (Nature 1, according to Kowarik's Four Natures approach), such as forests or wetlands conserved as forest parks or wetland parks. For example, a patch of remnant wetland habitat in Qunli District, Harbin was conserved as Qunli Wetland Park in 2010 (Figure 2.11). Designed by Turenscape, the park is also a stormwater park. Interestingly, before 2010, the surrounding area of the park was dominated by agricultural lands, and this wild park project built in 2010 promptly fuelled surrounding real estate development (Wang, 2018) (Figure 2.12). Tanghe Ribbon Park is another Turenscape case that conserved on-site wild habitat: the park's design incorporated limited artificial facilities, and the only main intervention was a wandering boardwalk lined by a red bench that combined seating, lighting and native grass specimens with interpreting signs (Figure 2.13).

Although novel wild ecosystems (Nature 4) tend to be eradicated and redeveloped for utilitarian uses in China (Hu and Lima, 2019), some wild park projects have made efforts to conserve them, for example, Jiangyangfan Eco-Park in Hangzhou (Hu *et al.*, 2022). Designed by Xiangrong Wang and his Atelier DYJG company, Jiangyangfan Eco-Park conserved all habitats naturally shaped on an urban wasteland. Detailed information about this park is presented in Section 4.4.2.

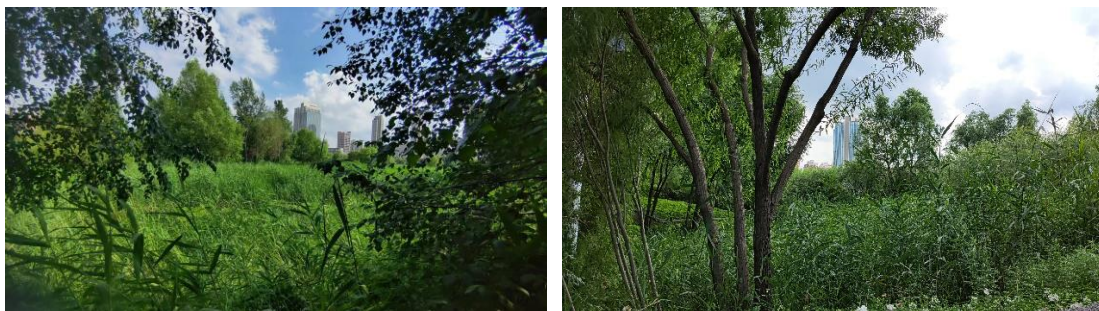


Figure 2.11 Qunli Wetland Park (photographed by the author)

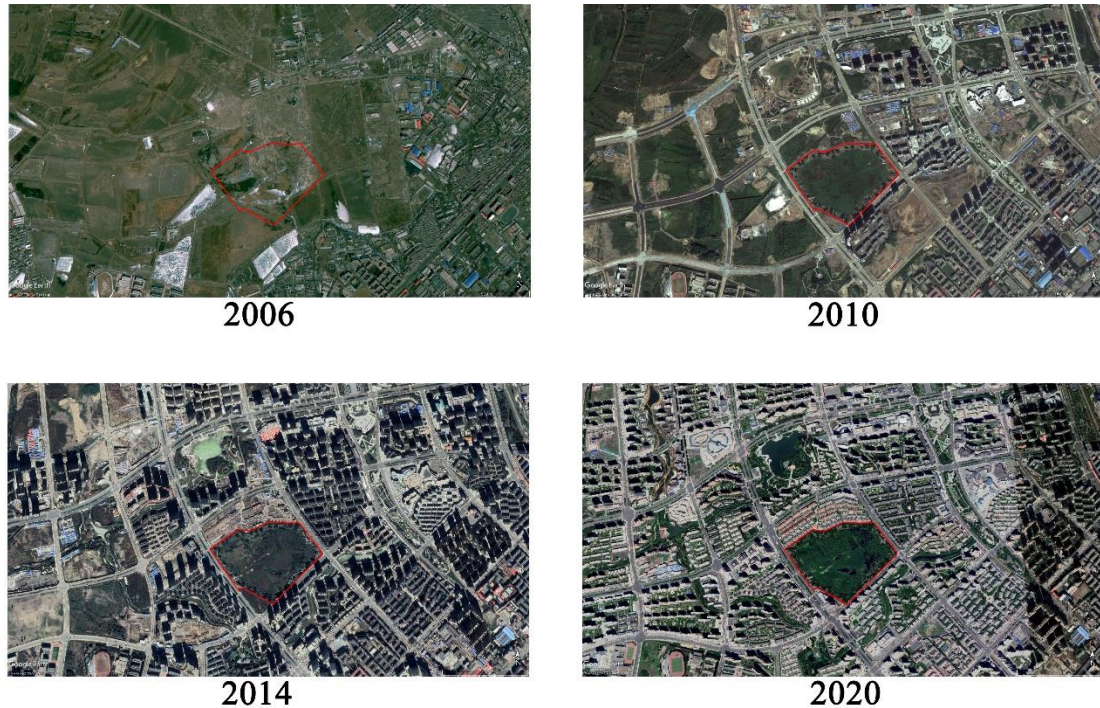


Figure 2.12 Land use changes around Qunli Wetland Park (the author generated this figure from Google Earth. The red line indicates the scope of Qunli Wetland Park)



Figure 2.13 Tanghe Ribbon Park conserved on-site biodiversity and incorporated limited artificial structures (<https://www.turenscape.com/>)

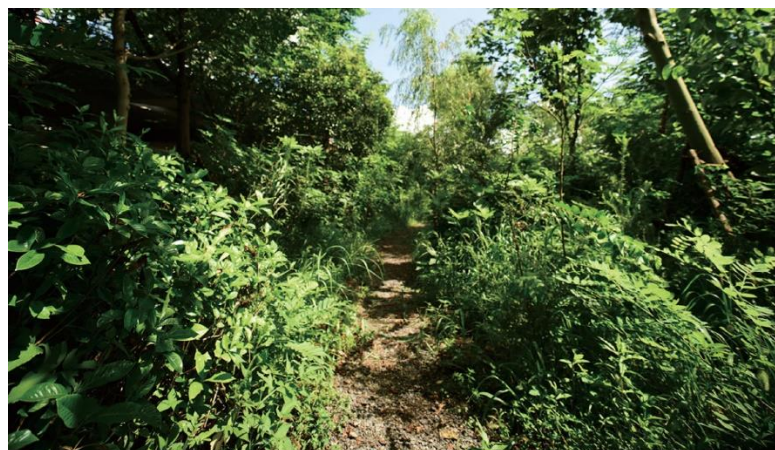
2.4.5.2 Restoring and rewilding ecosystems

Much attention has been paid to restoring and rewilding ecosystems to form wild parks. Constructed wetlands are frequently used in Chinese ecological restoration projects. Houtan Wetland Park, designed by Turenscape, was built on a wild industrial wasteland in Shanghai. In this park's design, an artificial linear wetland was constructed, together with the conservation of the on-site

wetland remnant. Detailed information about this park is presented in Section 4.4.2. Forest City Studio has used rewilding in their projects in Shanghai (Figure 2.14). The design of the Shanghai Urban Biodiversity Nature Education Base in Pujiang Park adopted five principles: 1) use native plant species, 2) design plant communities that are structured around natural plants and natural processes, 3) create diverse habitats and incorporate limited artificial structures to ensure wildlife activities, 4) create habitats for target species and 5) avoid placing facilities or signs with bright colours that may frighten wildlife (Guo and Shan, 2021).



(a) Shanghai Urban Biodiversity Nature Education Base in Pujiang Park, Shanghai



(b) Yijiayuan Nature Park, Shanghai

Figure 2.14 Rewilding projects designed by Forest City Studio (Guo and Shan, 2021)

2.4.5.3 Constructing new ecosystems

Near-natural forests (NNFs) are created in some wild parks to foster biodiversity.

The use of native species and structurally complex vegetation communities is a core component, and there is a great incorporation of natural succession and low-maintenance in the strategies to establish and maintain the vegetation of NNFs (Da and Song, 2008; Da and Guo, 2014). An example that extensively uses NNFs is the Guangyanggu Urban Forest Park (designed by Beijing Topsense Landscape Design) in Beijing. Human activities are limited to gravel roads and a wooden platform, covering only 8% of the park's total area (Wang *et al.*, 2021) because designers believe that frequent recreational use may negatively affect biodiversity.

This thesis defines urban parks in China built predominantly for biodiversity conservation/enhancement and other ecological functions (e.g. stormwater management, flood abatement and pollutant absorption) as Chinese wild parks. Based on reviews of Chinese wild park projects and relevant literature (Zhang and Zhang, 2002; Deng, 2003), the wild parks' main characteristics are summarised in Table 2.6.

Table 2.6 Main characteristics of Chinese urban wild parks

Chinese urban wild parks	
Main function	Biodiversity conservation/enhancement, other ecosystem services' provision (e.g. stormwater management, flood abatement, pollutant absorption), nature education, recreation and nature experience (e.g. wildlife observation).
Ecological/biodiversity value	Heterogeneous habitats, intend to support biodiversity.
Maintenance	Low intensive, near-natural maintenance approach to stimulate natural succession, elimination of pesticide/herbicide application, maintenance can be technical in regard to required ecological knowledge. Parks appear relatively wild/natural-looking.
Plantings	Structurally and compositionally complex plantings (e.g. multi-layered dense vegetation). Mainly native species.
Facilities and infrastructures	Limited artificial facilities. Have supporting facilities but may have few artificial recreational/entertainment facilities or attractions.

2.5 Relationships between maintenance/vegetation structure/facilities and biodiversity in urban green spaces

From previous reviews, it can be seen that some specific measures, including rewilding and lowering maintenance intensity, creating a multi-layered and heterogeneous vegetation structure, and lowering the density of large-scale artificial, built facilities and infrastructures, are being promoted as biodiversity-friendly measures in park design. Claims have been made about the biodiversity benefits associated with these specific measures, but what about the effectiveness of these measures in reality? Does an urban park with a lower degree of maintenance, a multi-layered and heterogeneous vegetation structure, and a lower density of built facilities and structures truly support higher levels of biodiversity in reality? This section reviews empirical studies on the relationships between maintenance/vegetation structure/facilities and biodiversity in the UGS context (the review focuses on urban parks but also includes studies on other types of UGSs, such as gardens or riparian areas).

2.5.1 Maintenance and biodiversity

In the reviewed literature (29 empirical papers), 76% found that sites with lower maintenance intensities were associated with higher biodiversity levels (see Appendix A-1). Most reviewed papers measured biodiversity levels through the measurement of species diversity, species richness, or other variables of the studied flora and/or fauna. Müller *et al.* (2018), however, measured biodiversity based on both species and habitat diversity. Their research revealed that lower maintenance intensities of parks were associated with increased biodiversity scores measured by the species richness of plants, birds and invertebrates as well as habitat diversity and structural complexity.

The association between lower maintenance intensities and higher biodiversity levels was predominantly found for plants (e.g. Bertoncini *et al.*, 2012; Müller *et al.*, 2018; Talal and Santelmann, 2019) and pollinators (e.g. Zuo *et al.*, 2008; Lin *et al.*, 2012; Aguilera *et al.*, 2019). Such an association was also found for birds and invertebrates (Müller *et al.*, 2018). Additionally, some studies (e.g. Öckinger, Dannestam and Smith, 2009; Venn and Kotze, 2014) showed that sites with the lowest maintenance intensities were associated with the highest levels of biodiversity compared with those with moderate and the highest maintenance levels.

However, some studies provided other results regarding maintenance-biodiversity links. Nizamani *et al.* (2021) found that woody plant species richness was positively correlated with maintenance intensity. Shwartz, Shirley and Kark (2008) found that bird species richness was lowest in intensively maintained sites; moreover, sites with intermediate levels of maintenance had higher or equal richness compared with unmaintained sites. This corresponds to the intermediate disturbance hypothesis (Connell, 1978).⁴ Maintenance-biodiversity links may also depend on the types of maintenance practices. Cheng *et al.* (2022) reported that fertilisation and trimming frequency, but not irrigation frequency, were significantly negatively associated with the species richness of spontaneous vegetation.

The review shows that the majority of the studies found the reduced maintenance intensity of parks allowing for natural ecological processes, i.e. greater wildness, was linked with higher levels of biodiversity. However, there is also evidence that maintenance promoted biodiversity, and maintenance-biodiversity links may depend on maintenance activities. In the initial phase of

⁴ The intermediate disturbance hypothesis (IDH) suggests that the highest species diversity is found when disturbances (e.g. human maintenance, human impacts and forest fires) are neither too rare nor too frequent (Connell, 1978).

ecosystem construction in park design, performing maintenance activities with care and ecological knowledge may promote biodiversity. Thus, the relationship between maintenance and biodiversity is complex and not straightforward. Nevertheless, the reduced maintenance of parks

“offers one among several possibilities for enhancing urban biodiversity... inhabitants would benefit not only from the wildness experience, but also an enhanced experience of biodiversity.” (Müller et al., 2018, p. 264)

2.5.2 Vegetation structure and biodiversity

Vegetation structure is defined here as the layer complexity of vegetation, which influences vegetation density. In the reviewed literature (23 papers), 74% found that multi-layered vegetation communities were important in sustaining urban biodiversity (see Appendix A-2). Empirical support for this positive role has largely tended towards studies on the species diversity of birds (e.g. Sandström, Angelstam and Mikusiński, 2006; Evans, Newson and Gaston, 2009; Yang *et al.*, 2015). The core role of multi-layered vegetation in sustaining insect biodiversity has also been found (Mata *et al.*, 2021; Han *et al.*, 2022). Two recent studies from Beijing reported that the richness of plants, insects and birds in parks dominated by multi-layered vegetation communities was significantly higher than those in parks with a two-layered planting of trees and lawns (Wang *et al.*, 2021; Wang *et al.*, 2022).

A few studies revealed no impact of the amount and cover of understory vegetation or the shrub layer on bird species richness (e.g. Jokimäki, 1999; Huang *et al.*, 2015). Heyman (2010) found that 90.0% clearance of understory vegetation resulted in a decline in bird abundance, while 50.0% patchy clearance did not.

2.5.3 Facilities and biodiversity

Among all the reviewed studies, 57% reported that the provision of more facilities (e.g. buildings, built structures, paths/trails and impervious surfaces) was negatively associated with levels of biodiversity, and this relationship was largely biased towards the species diversity of birds (e.g. Evans, Newson and Gaston, 2009; Myczko *et al.*, 2014; Ballantyne and Pickering, 2015; Gan, Wu and Guo, 2018; Amaya-Espinel *et al.*, 2019) (see Appendix A-3). Wood *et al.* (2018), however, found a positive association between site facilities (paths; recreational facilities, such as playgrounds and sports courts; supporting facilities, such as seating, lighting, etc.) and biodiversity in urban parks.

To sum up the review on the relationships between maintenance/vegetation structure/facilities and biodiversity in UGSs, it seems a number of reviewed papers reported that reduced maintenance intensities, multi-layered, structurally complex planting and limited use of artificial facilities were linked with higher levels of biodiversity. However, there is also other evidence and more nuanced findings. The review stresses the complex connections between maintenance/multi-layered planting/facilities and biodiversity.

2.6 Summary

While ornamental and recreational roles have traditionally been emphasised as a focus of urban parks, the most recent biodiversity-friendly approach is the response to the issue of current biodiversity crisis. In China, the nationwide CBM since the 1980s has shaped today's urban landscape dominated by manicured lawns, ornamental flowerbeds and hardscapes. Parks are mainly designed for anthropocentric purposes and marked by intensive maintenance, vegetation with relatively simple structures and compositions (e.g. lawns

scattered with single-tiered trees) and ample artificial facilities and structures. These parks are termed Chinese traditional parks in this thesis.

With the awareness of threats to urban biodiversity, critics of the biodiversity value of traditional parks, and concerns about the disconnection between biodiverse nature and urban residents in China, new biodiversity-friendly perspectives on urban parks have emerged in recent years. Biodiversity conservation/enhancement has been increasingly recognised as a prioritised park design goal. The Chinese biodiversity-friendly approach primarily emphasises working with nature and the restoration and creation of native, wild-looking ecosystems, like wetlands and forests. The use of native plant species is a focus. Other ecosystem services, such as stormwater management, flood abatement and environmental education, are also incorporated into the Chinese biodiversity-friendly approach sometimes. This has promoted the emergence of novel parks in Chinese cities, termed Chinese wild parks in this thesis, which show strong contrasts to traditional parks with ornamental, manicured characteristics. Chinese wild parks often have less manicured qualities, vegetation with relatively complex structures and compositions, and limited artificial facilities and structures compared with traditional parks. However, wild parks in China also include human interventions, such as a certain level of maintenance and traces of design.

After reviewing the origins, history and context of the biodiversity-friendly park agenda, how it is researched in studies directed at the human dimension has emerged as a further question. The next chapter explores the main theories and existing empirical work that bring the human dimension into biodiversity-related landscapes. These theories and empirical work are key for underpinning this research and helping to drive the study design and discussion.

Chapter 3: Landscape perception and preference in relation to biodiversity

3.1 Introduction

To understand the social context of the biodiversity-friendly park agenda, this chapter reviews theoretical and empirical studies of landscape perception and preference in relation to biodiversity. Despite the scope of this research being urban parks, in this chapter, other types of urban green spaces (UGSs), e.g. gardens and wastelands, are also incorporated in order to have a more complete literature review. The main point of this chapter is not to present an exhaustive picture of research engaging with landscape perception and preference associated with biodiversity but rather to explore the main theories, methods and empirical work that can drive the design and result discussion of this research.

3.2 Meanings of related terminologies

The meanings of related terminologies, such as perception and preference, and how they are used in this study are first discussed. There are two camps on the question of the nature of *perception* of our environment: 1) those who believe that our perception is primarily shaped by the stimulus information from the environment received (in a bottom-up approach) and 2) those who highlight people's own cognitive activities and interpretations (including expectations, past experiences and information, knowledge, etc.) in shaping our perception (in a top-down approach) (Patuano, 2018; Ward Thompson, 2018). Currently,

most theoretical models acknowledge the roles of both external information and internal mental constructs in shaping our perception, but the debate is on questions of emphasis.

Swanwick (2009) stated that landscape perception is

“concerned with both sensual (usually visual) responses to landscape and with the way that people attach meaning and value to it.” (Swanwick, 2009, p. S63)

This definition acknowledges the roles of both external information and people’s own interpretations in shaping landscape perception. Zube, Sell and Taylor (1982) proposed three elements of landscape perception: landscape, human and interaction. The landscape element (external) includes landscape components and landscape as an entity, while the human element (internal) contains past experience, knowledge, expectations and social-cultural contexts of individuals and groups. The interaction between the two elements generates landscape perception, resulting in outcomes that influence both the landscape and human elements in turn (Figure 3.1). Landscape perception involves all senses (sight, smell, sound, etc.), and sight may be the main sense contributing to landscape perception (Swanwick, 2009; Bell, 2012).

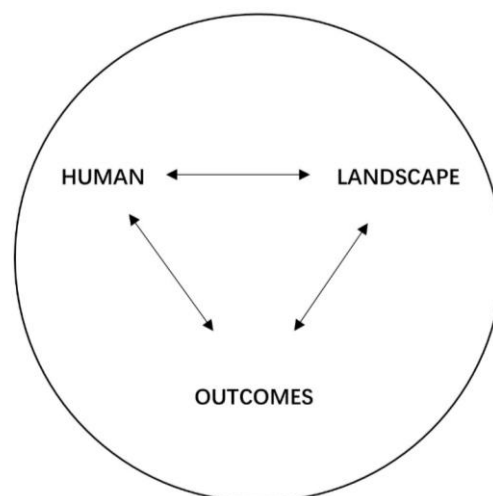


Figure 3.1 Model of landscape perception proposed by Zube, Sell and Taylor (1982)

The landscape aesthetic experience is part of landscape perception, involving not only the visual but also multisensory (smell, touch, hearing, etc.) experience (McClean, 2019). It may differ from the aesthetic appreciation of art due to some characteristics of landscape experience distinctive from art; for example, the necessary engagement with landscapes as well as the changing quality of landscapes (Bell, 2012; Ward Thompson, 2018).

Preference can be considered the positive outcome of perception. Kaplan and Kaplan (1982) believed that preference

“can be viewed as an expression of the evaluation of one’s possibilities. It is an extension of the perceptual process; like prediction, it enhances one’s readiness to act even though no action may be called for at that particular moment.” (Kaplan and Kaplan, 1982, quoted in Keane, 1990, p. 10)

Landscape preference research tends to concentrate on people’s preferences for different landscape types/styles/features to find out which one is preferred and the reasons behind that preference.

Specific to this study, *perception* is related to the interaction between landscapes (including features of landscapes) and the relevant perceptual and cognitive processes of humans. Perception is interpreted as a multisensory experience. *Preference* is the joint outcome of the interaction between humans and landscapes in relation to an overall judgement or evaluation.

3.3 Existing theories on landscape perception and preference in relation to biodiversity

The theories underlying this research are drawn together here to underpin the subject matter (Figure 3.2). The research subjects of people’s experiences of biodiversity and the relevant ecological practices are closely related to the

general conceptual frameworks of landscape perception and preference reviewed first in this section. The review then narrows the scope by focusing on landscape perception and preference in relation to biodiversity.

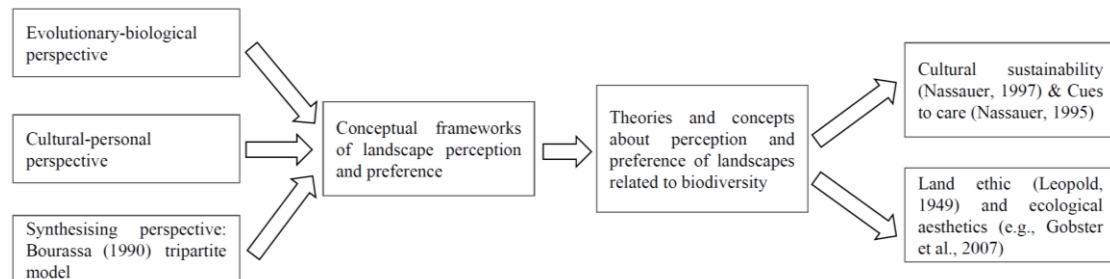


Figure 3.2 Existing theories on landscape perception and preference relating to biodiversity reviewed in this research (drawn by the author)

3.3.1 Landscape perception and preference: three perspectives

There are two camps of theoretical perspectives for explaining how we perceive and prefer landscapes: the evolutionary-biological perspective and the cultural-personal perspective. Much recent empirical work has taken a synthesising perspective from Bourassa's model (Bourassa, 1990), which acknowledges the roles of both evolutionary-biological and cultural-personal influences (Lindemann-Matthies *et al.*, 2010; Hoyle, 2015).

3.3.1.1 Evolutionary-biological perspective

The evolutionary-biological perspective interprets landscape perception and preference based on human biological needs for survival, with landscapes conducive to survival being the most preferred. Landscape preference is proposed to be coherent and predictable, and it is predominantly determined by the landscape itself rather than human cultural and personal backgrounds. There is a collection of theories based on the evolutionary-biological

assumption. Related theories are summarised below based on the works of Jorgensen (2004) and Bell (2012).

The *biophilia hypothesis* argues that humans have an innate emotional affiliation with natural environments and living organisms, e.g. plants and wildlife species (Kellert and Wilson, 1993). While some scholars suggest the value of biophilia for biodiversity conservation (Simaika and Samways, 2010), the opposite concept of *biophobia*, namely, the tendency of people to reject natural environments or wildlife that could threaten human survival during evolution, is also considered by other scholars (Orr, 1993; Ulrich, 1993). Recent research shows that humans may have diverse attitudes towards wildlife and wildlife conservation. Wildlife may be perceived favourable providing they are not harmful to people (Prokop and Randler, 2018; Castillo-Huitrón *et al.*, 2020).

The *savannah theory* (Orians and Heerwagen, 1992) argues that contemporary humans have innate preferences for savannah-like landscapes typically possessing half-open spaces with low ground cover and clumps of trees, since such landscapes supported human survival in the early crucial phase in evolution. Ulrich (1993) noted that savannah-like landscapes can be located in rural areas, urban fringes, and traditional picturesque urban parks.

The *prospect–refuge theory* (Appleton, 1975) proposes a more specific landscape preference configuration. It argues that in human evolution, the most essential need for survival is the possibility of seeing (the need for prospect) without being seen (the need for refuge, connected to safety). Landscapes that simultaneously provide prospect (features like wide, open views) and refuge (features like clusters of canopy trees as protected settings) are preferred. Appleton (1975) provided examples of landscapes where we can see without being seen in picturesque parks inspired by the 18th-century Picturesque

movement.

The Kaplans' *preference matrix* (Kaplan and Kaplan, 1989) introduces four critical factors in the structure of landscapes that are associated with and can be used to predict preferences: *coherence*, *legibility*, *complexity* and *mystery* (Table 3.1). The preference matrix suggests that humans prefer landscapes with optimal levels of *complexity* (how much there is to look at) and *mystery* (how much a landscape has a promise of information if one walks deeper into it) that invite *exploration*, e.g. trees or a curve in the path, yet simultaneously have sufficient *coherence* (how much a landscape is ordered) and *legibility* (how much a landscape is identifiable and interpretable), e.g. ordered scenes with good visual access, to be understood and to avoid getting lost (*understanding*). *Understanding* ensures safety for human survival, and the *exploration* of landscapes brings adaptive benefits as well. *Complexity* and *coherence* are accessible immediate information, whereas *legibility* and *mystery* involve inference (Kaplan and Kaplan, 1989).

Table 3.1 The Kaplans' preference matrix (Kaplan and Kaplan, 1989)

	Understanding	Exploration
Immediate	Coherence	Complexity
Inferred, predicted	Legibility	Mystery

The evolutionary-biological perspective argues for a universal preference, as shaped by human common evolution, for landscapes resembling savannahs and picturesque parks, since such landscapes have qualities that satisfy human biological needs to survive and contribute to people's personal safety.

3.3.1.2 Cultural-personal perspective

By contrast, the cultural-personal perspective argues that landscape perception and preference are beyond a universal response and differ according to people's cultural and personal backgrounds. Tuan (1974) noted that landscape

preferences may vary from culture to culture and differ between individuals with distinct personal attributes, such as gender, education and occupation. In empirical studies examining landscape perception and preference and biodiversity, cultural-personal background factors that have received scholars' attention include gender, age, education, ecological knowledge, childhood experience and living environment. These relevant studies are discussed in detail in Section 3.6.

The cultural-personal perspective does not try to identify a universally preferred landscape model; rather, it emphasises the richness, complexity and ambiguity of landscape experiences. Tuan (1974) argued that people's attitudes towards certain landscapes change over time; for example, Chinese attitudes towards mountains have changed from a religious attitude that combined awe and aversion to the contemporary positive evaluation that views mountains as ecological components to counter global environmental problems. People may value and fear certain landscapes simultaneously. Studies have found that urban wild woodlands were strongly valued and feared at the same time (Burgess, Harrison and Limb, 1988; Burgess, 1995; Jorgensen, Hitchmough and Dunnett, 2007). Regarding wild/naturalistic plantings and ecological design practices, there is also the likelihood that the public has conflicting perceptions towards them.

3.3.1.3 *Synthesising perspective*

Bourassa's (1990) tripartite conceptualisation model brings a synthesising perspective by postulating that landscape perception and preference have biological, cultural and personal components (Table 3.2). Bourassa sees the biological component as *laws*, which are transcultural constraints, and the cultural component as *rules*, which are transpersonal but intracultural constraints. As for the personal component, it is considered as *strategies*, which

are personal choices made within the possibilities established by *laws* and *rules* (Bourassa, 1990). The personal component also concerns opportunities because it can transcend biological *laws* and cultural *rules* through creativity. Bourassa believed landscape perception and preference as a system of constraints and opportunities.

Table 3.2 Bourassa's tripartite conceptualisation model, modified based on Bourassa (1990)

Components		Constraints and opportunities
Biological	—————▶	Laws
Cultural	—————▶	Rules
Personal	—————▶	Strategies

This research follows the synthesising perspective in acknowledging the roles of both evolutionary-biological and cultural-personal factors in defining landscape perception and preference. The evolutionary-biological factor emphasises the importance of landscape stimulus, e.g. the species-richness of a landscape, the heterogeneity of a landscape and its spatial structure (Lindemann-Matthies *et al.*, 2010), in defining landscape perception and preference, whereas the cultural-personal factor suggests the dominance of individuals' background influences. For the evolutionary-biological factor, this research tries to identify how the public in China reacts to certain landscape attributes and types, i.e. biodiversity richness itself as a park attribute and the wild park style (research objectives 1 and 2). For the cultural-personal factor, this research aims to address the extent to which the above-mentioned preferences are influenced by the respondents' gender, age, education, childhood living environment (rural or urban), ecological knowledge/interest, and residential context (city core or urban periphery) (research objective 3).

Due to a preoccupation with the general preferred qualities of landscapes, research methods used by the evolutionary-biological camp are usually

quantitative as an attempt to standardise landscapes and to make comparisons in a more objective way. This camp often uses visual stimuli (e.g. photo-based questionnaire) and focuses on the visual evaluation of landscape scenes. For the cultural-personal camp, landscapes are viewed as cultural-personal constructs with multiple, diverse and even conflicting meanings and values. Research methods by this camp often involve qualitative methods, such as interviews and focus groups. This thesis embraces both evolutionary-biological and cultural-personal factors and adopts both quantitative and qualitative research methods as a mixed-research study.

3.3.2 Landscape perception and preference and ecology

While theories on landscape perception and preference form a system of their own, there is a relatively small body concerning more biodiverse landscapes in particular. By drawing on the knowledge domains of aesthetics, perception, and ecological science, the thesis reviews theories that connect ecology with landscape perception and preference here, discussing the importance of a pleasant landscape experience for both human and ecosystem health, and the potential disjuncture between ecology and aesthetics.

3.3.2.1 *Aesthetics–ecology debate in landscape perception*

A pleasant landscape experience, i.e. a feeling of pleasure in response to a perceived landscape, is critical to both human and ecosystem health. It contributes to people's mental and physical health and may help reduce stress and restore attention (Beery *et al.*, 2017; Bratman *et al.*, 2019). As for the importance of a pleasant landscape experience for ecosystem health, the notion of *cultural sustainability* (Nassauer, 1997) advocates that landscapes that evoke positive responses and are appreciated by people are more likely to be sustained than landscapes that do not attract admiration. Perception and

aesthetic experiences can influence human decision making and actions for landscapes, thereby impacting landscapes' ecological integrity (Gobster *et al.*, 2007; St John, Keane and Milner-Gulland, 2013). People often avoid or "improve" landscapes they perceive as ugly, but such actions may or may not promote ecosystem health. For example, fires and dead wood in forests may appear destructive and aesthetically negative to many people. Management actions can be conducted to prevent them, but they may not be beneficial for forest ecosystem health because fires and dead wood are essential tools for maintaining forest biodiversity. Hence, ensuring the public's pleasant experiences and positive attitudes towards landscapes relating to biodiversity are a critical condition to sustaining these landscapes and their ecological functions.

Gobster *et al.* (2007) noted the possible disjunction between aesthetic preference and ecosystem health, which is the core of what they referred to as the aesthetics–ecology debate. What is aesthetically pleasing may or may not reflect biodiversity value. In some cases, aesthetics and biodiversity values are positively correlated. For example, wildlands that are perceived as aesthetically pleasing may be of high biodiversity value. However, in other cases, aesthetics may not reflect biodiversity value, and conversely, biodiversity can be seen as lacking aesthetic value. Large-scale tended lawns and monoculture may be perceived as aesthetically pleasing, but they can be of low biodiversity value. Biodiverse wetlands may be seen as wild, messy and aesthetically unattractive.

Gobster *et al.* (2007) tried to seek a more integral relationship between aesthetics and ecology. They proposed the model of human–environmental interactions in the landscape. This model (Figure 3.3) shows that environmental phenomena occur at a range of scales from global to microscopic, yet humans can readily perceive the narrow range of noticeable *landscape patterns* (the

perceptible realm), which is the landscape scale centred on human experiences of our surroundings. These landscape patterns are the tangible landscape interface of invisible ecological qualities and processes (Li and Nassauer, 2021). It may be difficult for people to directly sense biodiversity and ecological function within messy ecosystems, but the general public may perceive them by their immediate perceivable features, e.g. visual appearance. This suggests a specific perceptible scale wherein design may work to change people's aesthetic experiences and perceptions and establish a more integral relationship between aesthetics and ecology.

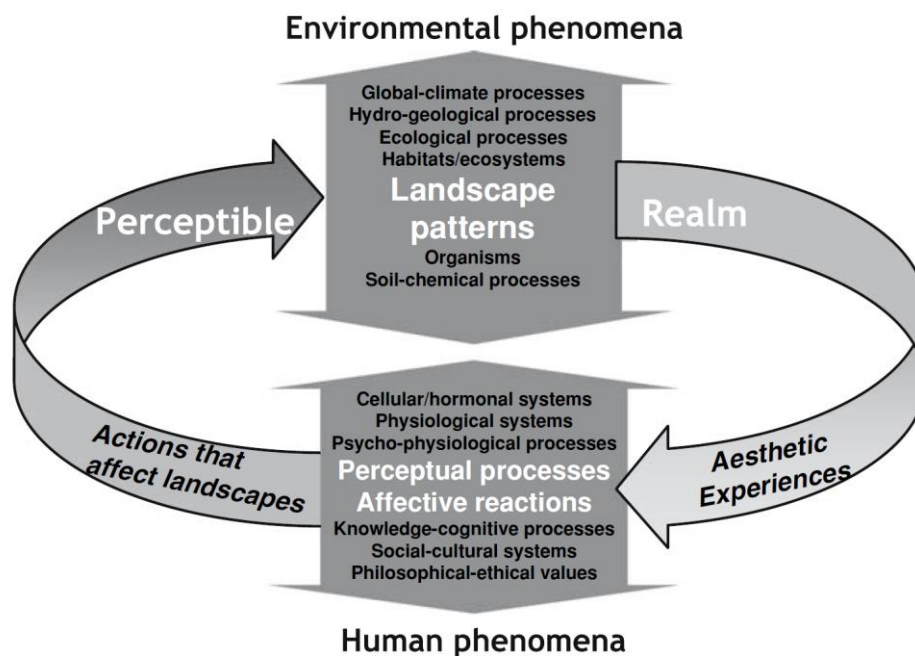


Figure 3.3 Model of human–environmental interactions in the landscape (Gobster *et al.*, 2007)

3.3.2.2 Cues to care

Accordingly, Nassauer (1995) proposed cues to care (CTC) as design tactics or environmental interventions to help the general public value messy ecosystems. These messy ecosystems include wetlands, meadows, rainwater gardens and other ecosystems relevant to biodiversity and ecological restoration that appear in the contemporary landscape design agenda. CTC

articulate that in order for messy ecosystems to be appreciated and sustained over the long term, they need to be framed by visible and immediately recognisable elements that convey human intention and care. CTC work as

“a means of adapting cultural expectations to recognise new landscape forms that include greater biodiversity.” (Nassauer, 1995, p. 167)

Some exemplary CTC in residential and agricultural landscapes in the Midwestern US context have been suggested (Nassauer, 1995), including 1) mowing, 2) flowering plants and trees, 3) wildlife feeders and houses, 4) bold patterns (e.g. stripcropping), 5) trimmed shrubs, plants in rows, linear planting designs, 6) fences, architectural details, lawn ornaments, painting and 7) foundation planting. While CTC may vary with cultural and landscape contexts, studies have tested the effectiveness of some of the above-mentioned ones in urban woodlands in the UK's residential communities (Jorgensen, Hitchmough and Dunnett, 2007; Ward Thompson, Roe and Aspinall, 2013), in meadow-like lawns in Sweden (Ignatieva *et al.*, 2017), in urban derelict land in Germany (Hofmann *et al.*, 2012) and Estonia (Unt and Bell, 2014), and in UGSs in Singapore (Hwang and Yue, 2019).

For this study, CTC lead to the question of beneficial environmental interventions for biodiverse, wild-styled urban parks, which can make these parks more favourable in the Chinese cultural context (Q6 in research objective 2). The above-mentioned exemplary CTC are applicable in the Midwestern US context, and how they work in urban parks in China is a research gap.

3.3.2.3 Land ethic and ecological aesthetics

Some scholars (Saito, 1998; Gobster *et al.*, 2007) have attempted to focus on the social side to integrate aesthetics and ecology by encouraging a normative ecological aesthetic. Ecological aesthetics assert that the appreciation of landscapes is founded on using our intellect (e.g. knowledge of the landscape

and its ecological quality) and all our senses (i.e. multi-sensual and more active engagement with the landscape) (Berleant, 1992) rather than relying only on visual cues.

Advocates of ecological aesthetics are largely informed by the notion of land ethic proposed by Aldo Leopold, which claims that

“A thing is right when it tends to preserve the integrity, stability, and beauty of the biotic community. It is wrong when it tends otherwise.” (Leopold, 1949, pp. 224-225)

Land ethic argues for the rejection of strictly human-centred, anthropocentric views of the land. It focuses on the conservation of wilderness areas, natural habitats and wildlife through an ethical concern of their entitlement to exist. Interestingly, it seems that land ethic echoes the essence of the Chinese traditional philosophy of *oneness with nature* (Chen and Wu, 2009) advocating harmony between humans and nature. Land ethic expands ways of thinking about landscape aesthetics from conventional scenic aesthetics to novel ecological aesthetics. Scenic aesthetic is a popular, visual-dominated aesthetic preference mode that leads people to regard landscapes as two-dimensional scenes and to appreciate their picturesque and scenically beautiful parts, whereas the *unscenic* but ecologically important parts (Saito, 1998) tend to be ignored. Some scholars have claimed that we must look beyond landscapes' surface and visual qualities to develop ecological aesthetics, a new aesthetic mode primarily informed by our knowledge and understanding of landscapes and their ecological value (Saito, 1998; Gobster *et al.*, 2007) and multi-sensual engagement with landscapes (Berleant, 1992).

Ecological aesthetics involve non-perceptual and intellectual aspects. Carlson (1995; 1999) and Budd (2008) asserted that science and knowledge enable us to shift from aesthetic appreciation predicated on only phenomenological and

subjective experiences to a more objective appreciation that avoids individualistic criteria (Mclean, 2019). This, however, introduces the question of the extent to which relevant ecological knowledge and information *can* (as a practical matter) influence aesthetic experiences and perceptions. While some studies have offered no support for the efficacy of ecological information (Hill and Daniel, 2007), others found its positive role in influencing public preferences and enhancing support for biodiversity-friendly design options (Gundersen *et al.*, 2017).

A review of the theories of land ethic and ecological aesthetics is relevant to this research because it generates the question of whether related ecological knowledge can influence Chinese people's preferences for biodiversity richness as a park attribute/element as well as the wild park style indicating an ecological aesthetic (Q7 in research objective 3).

3.4 Public perceptions of and preferences for biodiversity in urban green spaces

This section reviews existing empirical studies on perceptions of and preferences for biodiverse UGSs. Three themes are generated from this review: 1) public perceptions of and preferences for biodiversity in UGSs, 2) public perceptions of and preferences for wild/naturalistic UGSs and 3) preferences for biodiversity and for different styles/types of UGSs within different sociocultural groups. The review is presented according to these three themes.

3.4.1 Public attitudes towards biodiversity

A number of studies have investigated public attitudes towards biodiversity.

Most used qualitative methods, such as focus groups and interviews. There is evidence of the public's rich mental concepts of biodiversity, e.g. the diversity of animals and plants and human–nature interactions, irrespective of their scientific/ecological knowledge (Fischer and Young, 2007). Campbell-Arvai (2019) found that citizens strongly valued cultural ecosystem services, e.g. spiritual benefits and delight in seeing nature, provided by urban biodiversity. Gyllin and Grahn (2005) found that people's experienced biodiversity was relevant to words with biological content (e.g. species richness of both plants and animals) and environments exhibiting qualities of wilderness, nature, and variation.

However, when qualifying public knowledge of biodiversity and wildlife as correct or not, the picture is quite different. Keane *et al.* (2011) found local people's knowledge of Madagascar's wildlife species laws was generally poor. Muratet *et al.* (2015) found in a French park, park users' knowledge of plant species was generally low and focused on ornamental plants. Similar findings were also identified from a Latin American study that investigated urban park users' ecological knowledge of different species (Parra-Saldívar *et al.*, 2020). Lindemann-Matthies and Bose (2008) revealed in Switzerland, the concept of biodiversity was not widely known to the public.

3.4.2 Public preferences for biodiversity in urban green spaces

A number of Western studies have examined public preferences for biodiversity in UGSs, predominantly using quantitative methods, such as questionnaires (Fischer *et al.*, 2018), visitor-employed photography (VEP) (Qiu, Lindberg and Nielsen, 2013) and experiments (Shwartz *et al.*, 2014). Species richness was often used as a surrogate for biodiversity to communicate with the public. There is promising evidence of positive valuations of biodiversity in urban parks

(Fischer *et al.*, 2018), gardens (Lindemann-Matthies and Marty, 2013), wastelands (Fischer *et al.*, 2018), and urban meadows (Southon *et al.*, 2017; Fischer *et al.*, 2020). However, Qiu, Lindberg and Nielsen (2013) found that high biodiversity in urban parks was not positively correlated with preferences in Sweden. An Australian study (Shanahan *et al.*, 2015) found a similar result, showing that people did not show a preference for visiting parks with greater cover of trees and native vegetation remnants. Schwartz *et al.* (2014) found a more nuanced result in France: the research participants preferred a rich diversity of species, but not of insects, in the studied gardens, and the participants related this species diversity to their well-being. Some studies from different regions (e.g. Europe, Australia) particularly focused on the relationship between psychological benefits/wellbeing and biodiversity richness in UGSs, finding a positive association between psychological benefits and actual flora biodiversity (Fuller *et al.*, 2007; Mavoa *et al.*, 2019), as well as fauna biodiversity (Mavoa *et al.*, 2019), and other mixed evidence, e.g. the positive role of perceived biodiversity for wellbeing (Dallimer *et al.*, 2012; Hoyle, Hitchmough and Jorgensen, 2017; Schebella *et al.*, 2019).

While there is evidence of public appreciation of biodiversity in parks, the question of how residents prefer and value the importance of biodiversity compared with other relevant environmental attributes involved in park design remains open. Understanding public perceptions of the relative importance of biodiversity in parks is important because prioritising biodiversity conservation/enhancement may potentially conflict with other park attributes residents care about, such as maintenance, the ornamental/neat character of landscape beauty, and facility provision (see Section 2.5 in Chapter 2). Designers need to understand public trade-offs between these attributes in order to enhance the success of biodiversity-related projects. Research in European cities showed that the park attributes of facilities, beauty, and

accessibility were more important than biodiversity (Voigt *et al.*, 2014; Bertram and Rehdanz, 2015). The study by Madureira *et al.* (2018) conducted in Portuguese cities found that maintenance was perceived as more important than biodiversity, whereas the Dutch study by van Vliet *et al.* (2021) found the diversity of flowers in flowerbeds (which they termed as “biodiversity”) and the number of trees were the most important park attributes. The relative importance of biodiversity compared with other park attributes is still an open question and has not been sufficiently addressed in China (Hu *et al.*, 2022).

3.4.3 People–biodiversity paradox in urban green spaces

Several scholars have highlighted the *people–biodiversity paradox* (Dallimer *et al.*, 2012; Schwartz *et al.*, 2014; Pett *et al.*, 2016), which is a mismatch between 1) the public’s demand for and appreciation of biodiversity and its importance for the quality of life and well-being, and 2) the public’s limited ability to accurately recognise and perceive it. This paradox can raise a challenge because improving biodiversity in UGSs may not necessarily satisfy public needs for biodiversity if people do not notice or are not consciously aware of its existence or enhancement.

The *people–biodiversity paradox* may be explained by the general public’s lack of ecological expertise and scientific knowledge, which limits people’s ability to consciously experience biodiversity in spite of their declared intent. It may be difficult for the general public to directly sense biodiversity and ecological function. Furthermore, the extinction of experience hypothesis (Pyle, 1978; Miller, 2005) may also contribute to this paradox. Extinction of experience argues that people are increasingly isolated from the experience of nature in their everyday lives, and as such, they may have reduced abilities to notice and experience biodiversity, resulting in a lack of support for biodiversity

conservation. These consequences further beget isolation from nature, leading to a cycle of impoverishment (Figure 3.4).

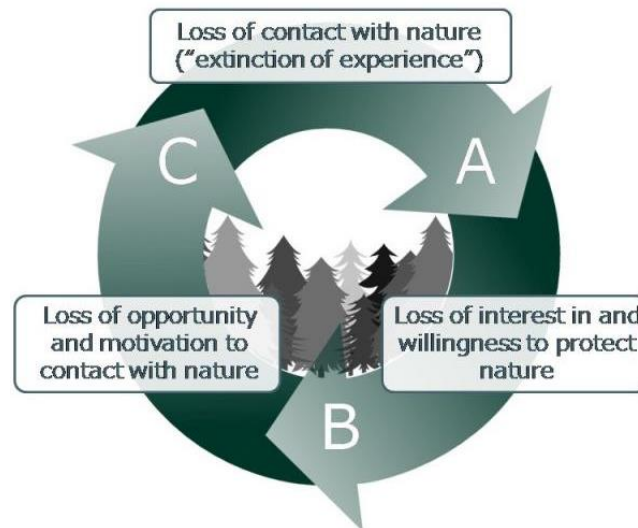


Figure 3.4 Extinction of experience hypothesis
(<https://www.wildtrout.org/wttblog/extinction-experience>)

3.5 Public perceptions of and preferences for wild/naturalistic urban green spaces

Another theme emerging from the empirical study review is about public perceptions and preferences of wild/naturalistic UGSs, including intentionally designed or managed wild-styled UGSs and informal urban green spaces (IGSs). IGSs are urban leftover spaces overgrown with spontaneous vegetation (Rupprecht and Byrne, 2014). Typical IGSs include vacant lots, abandoned railways, wastelands and street verges.

3.5.1 Public perceptions of wild/naturalistic urban green spaces

The literature on public perceptions of wild/naturalistic UGSs has highlighted

some dimensions that deserve attention: safety, character, and restoration. These focal points are closely connected to the predominant perceivable physical character of wild/naturalistic UGSs, namely wilderness-like or near-nature with less manicured features.

3.5.1.1 Safety

The *prospect–refuge theory* (Appleton, 1975) implies safety as the imperative need in supporting human survival and that humans prefer landscapes that signal features that enhance a sense of safety. Using a wide range of methods, including focus groups, questionnaires and mixed methods, a number of studies revealed public anxiety about their personal safety in wild/naturalistic UGSs (Jorgensen, Hitchmough and Dunnett, 2007; Lis and Iwankowski, 2021). However, Ozguner and Kendle (2006) found that their respondents felt comfortable and safe in a naturalistic urban park in Sheffield.

According to the *preference matrix* (Kaplan and Kaplan, 1989), it seems that natural, dense, less manicured vegetation enhances landscapes' *mystery* and *complexity* but reduces *legibility* and *coherence*, triggering a sense of loss and insecurity. Dense vegetation with a lack of sight lines, where an attacker may easily hide, can evoke perceived insecurity and fears of crime. Furthermore, many studies (Jorgensen, Hitchmough and Dunnett, 2007; Sonti *et al.*, 2020) have concentrated on women's higher perceived insecurity in wild/naturalistic UGSs compared with men.

3.5.1.2 Character

Ozguner and Kendle (2006) found that their study's participants positively perceived a naturalistic-style urban park as a natural and random place. IGSs, such as wastelands (Mathey *et al.*, 2018) and wild-growing vegetated roadsides (Weber, Kowarik and Säumel, 2014), were also perceived as natural and wild,

playing a significant role for satisfying residents' needs for contact with natural environments. Residents also felt that wild/naturalistic UGSs were conducive to biodiversity and nature conservation (Weber, Kowarik and Säumel, 2014). A German Nature Awareness Study (Kowarik, 2018) revealed that most residents believed cities needed natural spaces where wild flora and fauna could find their homes. The study by Ignatieva *et al.* (2017) in Sweden revealed lawn alternatives (i.e. flower-rich lawns, meadows with perennials framed by cut lawn, and pictorial meadows) were appreciated yet their implementation should be adjusted to each site's condition. The literature has also shown that, apart from the nature-related character, *otherness*, namely the contrast to conventional, formal UGSs in terms of social patterns, i.e. adventurous versus controlled, was an attractive character of wild/naturalistic UGSs (Rupprecht *et al.*, 2015; Kowarik, 2018), especially among younger children (Bell, Ward Thompson and Travlou, 2003).

However, studies also revealed that residents considered wild/naturalistic UGSs as untidy, unmanaged and derelict (Ward Thompson *et al.*, 2004; Mathey *et al.*, 2018; Phillips and Lindquist, 2021). Rink and Emmrich (2005) found IGSs were not perceived as "urban nature" from the perspective of the public because IGSs were not managed and useless, going against conventional ideas of cities with civilised aesthetics, order, and maintenance. Such perceptions can be linked with the other side of ecosystem services, namely, ecosystem disservices which describe perceived negative aspects of ecosystems for human preferences and well-being (Lyytimäki and Sipilä, 2009). It seems negative feelings towards IGSs' ecosystem disservices were strongly conveyed from the Global South where budgets for some countries' public UGS management are limited. Manyani, Shackleton and Cocks (2021) found unkempt condition, dense vegetation, associated safety problems, and lack of recreational facilities deterred residents from visiting public UGSs in South

Africa, although IGSs were the most visited type, which was a result of the inadequacy of well-maintained formal urban parks and the easy accessibility of IGSs near people's homes. de Val (2023) also found green spaces with wild USV received lower preferences than formal parks covered with manicured lawns and cultivated trees in Latin America.

3.5.1.3 Restoration

According to the attention restoration theory (ART) proposed by Kaplan and Kaplan (1989), a combination of four components, i.e. *fascination* (environment is interesting and draws people's attention without effort), *being away* (environment offers people a psychological escape from everyday experiences), *extent* (environment allows people to feel immersed) and *compatibility* (fit between the environment and people's purposes and inclinations for activities), enhances the potential of an environment to provide a restorative experience. Van den Berg, Jorgensen and Wilson (2014) stated that theoretically, wild/naturalistic UGSs appear to conform to all four components of ART: these UGSs are rich in vegetation structural complexity and composition and thus may function as a source of *fascination* and contribute to a sense of *being away* and *extent*, and they also support different types of activities, ensuring *compatibility*. Colley, Brown and Montarzino (2016) found the restoration potential of wild/naturalistic UGSs at work. There is evidence of a stronger restoration impact in wild, dense forests compared with urban traditional parks (White *et al.*, 2013) and botanical parks (Laumann, Gärling and Stormark, 2001). Van den Berg, Jorgensen and Wilson (2014) and Tyrväinen *et al.* (2014), however, found non-significant differences in restoration impacts between UGSs with varying degrees of wildness.

3.5.2 Public preferences between wild/naturalistic and

traditional/ornamental urban green spaces

A great deal of research has investigated public preferences for wild/naturalistic UGSs versus traditional/ornamental designed UGSs, including studies conducted in Europe (Hofmann *et al.*, 2012; Hoyle, Hitchmough and Jorgensen, 2017), America (Zheng, Zhang and Chen, 2011), Australia (Harris *et al.*, 2018; Trigger and Head, 2010), and Singapore (Khew, Yokohari and Tanaka, 2014). These studies largely adopted quantitative photograph-based questionnaires. Taken as a whole, they showed inconsistent results with a mixed picture, despite that traditional/ornamental parklands with large expanses of manicured lawns and trees are common urban landscapes in these countries: some studies reported a preference for the traditional/ornamental (Zheng, Zhang and Chen, 2011; Hofmann *et al.*, 2012; Qiu, Lindberg and Nielsen, 2013; Khew, Yokohari and Tanaka, 2014), while others reported a preference for the wild/naturalistic (Kaplan, 2007; Caula, Hvenegaard and Marty, 2009; Hoyle, Hitchmough and Jorgensen, 2017; Harris *et al.*, 2018). Ozguner and Kendle (2006) found that the public appreciated both wild/naturalistic and traditional/ornamental park styles in Sheffield.

3.6 Impact of sociocultural factors affecting preferences for biodiversity and for different styles/types of urban green spaces

3.6.1 Gender, age and education

Lindemann-Matthies and Bose (2007) found that when respondents were asked to create their ideal meadows, women configured more biodiverse meadows than men. Palliwoda, Kowarik and von der Lippe (2017) found that significantly more females (78%) than males interacted with individual plant

species in urban parks. As reviewed before (Section 3.5.1), women were found to be more fearful than men in wild/naturalistic UGSs. However, it seems unwise to speculate that women would be more reluctant than men to accept wild/naturalistic UGSs. Fischer *et al.* (2020) reported that females were more likely to support a hypothetical scenario that half a per cent of the city's lawns would be converted into naturalistic tall-grass meadows. There is evidence that older people were more likely to prefer biodiversity (Lindemann-Matthies and Bose, 2007; Schwartz *et al.*, 2013). However, Fischer *et al.* (2018) found that age was a non-significant factor influencing preferences for biodiversity in urban parks, wastelands, and streetscapes.

It has been shown that residents with higher levels of education were more likely to prefer biodiversity (Schwartz *et al.*, 2013; Fischer *et al.*, 2018). Keane *et al.* (2011) found better-educated respondents were more aware of protected species. Evidence has also shown that preferences for wild/naturalistic landscapes were higher in better-educated respondents (De Groot and Van Den Born, 2003; Bjerke *et al.*, 2006).

3.6.2 Living environment and childhood experience

Hope *et al.* (2003) proposed the notion of the *luxury effect* whereby urban areas with higher socioeconomic status tended to have higher levels of plant diversity, suggesting that people may experience different levels of biodiversity depending on their economic situation. Indeed, there is evidence that people in wealthier countries had higher environmental concerns and cared more about the environment compared with people in poorer countries (Franzen and Vogl, 2013). It seems likely that if people have more opportunities to experience biodiversity in their living environment, they would be more likely to appreciate biodiversity and be supportive of policies and strategies aiming to promote

biodiversity. This reflects the extinction of experience hypothesis (Section 3.4.3) which argues that a disconnection between people and biodiversity may lead to a lack of support for conservation policies and strategies.

Scholars from different countries have paid attention to the relationship between childhood experience and preferences for biodiversity and wild/naturalistic UGSs, and revealed inconsistent findings. French studies from Shwartz *et al.* (2013) and Shwartz *et al.* (2014) found that study participants who grew up in natural, wilder areas during childhood showed higher levels of biodiversity awareness and appreciation. Ward Thompson, Aspinall and Montarzino (2008) reported the significance of childhood experiences of woodlands and other natural green spaces on adult visits to these spaces in Britain. However, a study from New Zealand revealed a contrary finding that adults with more childhood nature experiences did not choose more biodiverse spaces to visit (van Heezik *et al.*, 2021).

It seems that naturalistic/wild UGSs can evoke people's past experiences, including childhood memories. This can be linked with the concept of *place attachment*, namely, "the emotional and psychological connections between people and place" (Walker and Ryan, 2008, p. 141), which may elicit an individual's positive perceptions of the place (Tuan, 1975). Hoyle (2015) found place attachment in relation to wild woodlands and naturalistic meadows but not in the case of more formal, conventional planting. Jorgensen and Anthopoulou (2007) found older people's affection for urban woodlands because woodlands evoked memories of childhood play and the woods' local history. It seems likely that wild/naturalistic UGSs can provide people with "bridges to the past" (Manzo, 2005, p. 74).

3.6.3 Landscape/ecology knowledge and expertise

Research has found that those with ecology/landscape knowledge showed a more positive response to biodiversity compared with those without (Lindemann-Matthies and Bose, 2007; Schwartz *et al.*, 2013; Fischer *et al.*, 2020). The research by Keane *et al.* (2011) found those who engaged in environmental issues (e.g., involved in local forest management) were more likely to correctly classify protected species. Some studies found ecology/landscape professionals were more likely to prefer biodiversity (Lindemann-Matthies *et al.*, 2014), or certain aspects of biodiversity, e.g. woodland edges, dead wood (Qiu, Lindberg and Nielsen, 2013) and spontaneous plant biodiversity (Muratet *et al.*, 2015), compared with the public.

There may be conflicts between the public and professionals regarding preferences for wild/naturalistic or traditional/ornamental styles of UGSs. There is evidence that professionals preferred the wild/naturalistic (Hofmann *et al.*, 2012; Hwang *et al.*, 2019), whereas the public preferred the traditional (Hofmann *et al.*, 2012). Ozguner, Kendle and Bisgrove (2007) revealed professionals from conservation trusts highly appreciated wild/naturalistic UGSs, but those from local authorities and private landscape practices recognised the need for a balance between the two styles.

3.7 Chinese context in relation to perceptions of and preferences for biodiversity and for different styles/types of urban green spaces

One factor of the synthesising perspective of landscape perception and preference (Bourassa, 1990) is culture, meaning that cultural influences play a role in forming landscape perception and preference. This section moves into the Chinese context to understand Chinese perceptions and preferences within their particular cultural context.

3.7.1 Chinese views of nature and wilderness

Before examining the relevant empirical studies, it is helpful to have an overview of the Chinese views of nature and wilderness. *Oneness with nature*, i.e. humans and nature are part of an integrated whole, and humans should respect and harmonise with nature, is a widely recognised representation of the traditional Chinese view of an appropriate human–nature relationship. According to Van den Born *et al.* (2001), *oneness with nature* is a non-anthropocentric view relating to New Age and deep ecology. *Oneness with nature* seems in tune with today's global theme of ecological conservation and sustainability. Chinese classical gardens, a by-product of the view of *oneness with nature*, have been promoted by some scholars (Chen and Wu, 2009) in terms of garden design concerns for ecological fitness and related ecological measures, such as using native plant species and protecting ancient trees.

However, other scholars have argued that the view of *oneness with nature* is only philosophical rather than scientific (Han, 2006; Zhu, 2013). Han (2006) noted that *oneness with nature* is “anthropocentric for the instrumental aesthetic and spiritual values of nature” (p. 219). Zhu (2013) criticised *oneness with nature* as only generally providing an ontological basis for the necessity of harmonious coexistence between man and nature, but it does not point out how to achieve this coexistence. Zhu further argued that the focus on *unity* by *oneness with nature* rarely considers how humans, as subjects, understand the laws of nature. In parallel, some scholars, such as Kongjian Yu, suggested that Chinese classical gardens are artificial and anthropocentric products in which visual aesthetic is prominently featured, whereas ecological health is inadequately considered (Yu and Padua, 2006).

Wilderness is a close concept in relation to views of nature. Chen, Hao and Qi (2017) argued for the “rejection of wilderness” (p. 160) in Chinese traditional

culture because there is a bias for humanised and civilised nature rather than true wilderness (i.e. areas without human influences) in traditional Chinese landscape preferences. However, Tin and Yang (2016) noted that in traditional Chinese culture, wilderness and domestic areas complement each other because *oneness with nature* advocates unity and no distinction between humans and nature. Tin and Yang (2016) highlighted the existence of an appreciation for the wilderness in Chinese traditional shan shui (山水) poetry. In this poetry genre, poets depict wild nature and symbolise it as an idealised place for developing intimate human–nature relationships and escaping the constraints of society.

Rapid urbanisation since 1978 has caused the increasing scarcity of pristine wilderness in China. Climate change, desertification, pollution and other environmental issues have raised Chinese governmental concerns and scholars' attention. They have started to consider the role of wilderness in responding to environmental issues and coordinating the tension between humans and nature. The policy of *Ecological Civilisation* provides a solid foundation for promoting Chinese wilderness conservation (Cao *et al.*, 2022).

3.7.2 Existing empirical studies on Chinese perceptions of and preferences for biodiversity and for different styles/types of urban green spaces

Some Chinese studies have engaged with public preferences for ecosystem services and biodiversity in UGSs. Research has reported that biodiversity-related ecosystem services, e.g. wildlife habitat and species conservation, drew limited public attention, whereas ecosystem services directly associated with public life, such as the amelioration of microclimates and improvements in air

quality, received much attention (Jim and Chen, 2006a; Jim and Chen, 2006b; Chen and Jim, 2010; Zhang *et al.*, 2020). Other research, however, found public appreciation for park biodiversity (Gao *et al.*, 2019). Biodiversity was seen to be even more important than the anthropocentric aspects of parks, such as recreation facilities (Chen *et al.*, 2018) and cultural services (Yang, 2021a). However, these studies all focused on a particular park site, and the results were all site-based, which may limit general statements.

Studies have found that the Chinese public preferred lawns and flowerbeds over spontaneous vegetation and naturalistic meadows (Jiang and Yuan, 2017; Li *et al.*, 2019b). Wang *et al.* (2017) found that wild herbaceous plants could be freely introduced into dynamic areas (e.g. sports fields) in parks, whereas manicured lawns were more preferred in quiet resting zones. Yang *et al.* (2019b) found biodiverse lawn alternatives, namely, diverse herbaceous plant species, could be introduced to ecological, suburban areas but not in urban areas.

While these studies engaged with public preferences for UGS styles, most focused on visual evaluation (e.g. using photo-based questionnaires). More research is needed to consider other perceptual dimensions (sound, smell, etc.) that also contribute to landscape perceptions and preferences, as well as the meanings attached to the examined UGSs and the experiential interactions between residents and UGSs.

3.8 Summary

This chapter reviews the theories and existing empirical studies that bring the human dimension into biodiversity-related landscapes. The study follows the synthesising perspective on landscape perception and preference (Bourassa, 1990) in acknowledging the roles of both evolutionary-biological and cultural-

personal factors in defining landscape perception and preference. Based on the synthesising perspective, this chapter then reviews existing empirical studies associated with the topic of perceptions of and preferences for biodiverse UGSs. For the evolutionary-biological factor, this chapter reviews relevant empirical studies and identified two themes: 1) public perceptions of and preferences for biodiversity in UGSs and 2) public perceptions of and preferences for the wild/naturalistic UGS style. For the cultural-personal factor, the review identifies the following theme: 3) the impact of sociocultural factors affecting preferences for biodiversity and for different styles/types of UGSs.

After reviewing relevant studies in the Chinese context, this study finds that the three above-mentioned research themes have not yet been sufficiently addressed and clarified in China, and related Chinese studies are scarce compared with studies from the Western world. This has led to the condition that the Chinese social context of the contemporary biodiversity-friendly urban park agenda remains unclear and open. Moreover, most of the relevant Chinese studies were quantitative and purely visual preference research using photograph-based questionnaires with less considerations of the experiential interactions between people and the examined UGSs as well as the multiple meanings that may be assigned to these spaces. The next chapter details the research questions in this study and presents the overall methodology used to answer the research questions.

PART II (Chapters 4, 5, 6, and 7)

Chapter 4: Research questions and methodology

4.1 Introduction

The previous chapter reviews theoretical and empirical research on landscape perception and preference in relation to biodiversity. There, it is shown that the issues of perceptions of and preferences for biodiversity and wild UGSs have not been sufficiently addressed in the Chinese research context. Much research has been conducted in Western cities, whereas related Chinese studies are scarce and have yielded ambiguous results (e.g. Jim and Chen, 2006a; Zhang *et al.*, 2020 versus Chen *et al.*, 2018; Yang, 2021a). This chapter first elaborates on the research questions (Section 4.2). Next, the chapter builds the overall suitable research methodology for answering the research questions (Section 4.3) by discussing the case study, mixed-method research, the research procedure and ethics. Finally, the chapter details each research method used (Sections 4.4, 4.5 and 4.6).

4.2 Research questions

Overall, this research aims to comprehend the biodiversity-friendly approach to urban park design from the social perspective in China to link the biodiversity and social values of Chinese urban parks. The main research question of this study is

In urban park settings, how does the public respond to biodiversity and the wild park style that recently emerged in China?

Three research objectives and their corresponding research questions have

been formulated based on this main research question.

Research objective 1:

To examine public reaction to biodiversity in urban parks in order to discover whether the public prefers richer biodiversity and deems that biodiversity conservation/enhancement should be a prioritised aim in urban park practices. While the term biodiversity embraces the habitat/ecosystem, species and gene levels (see Section 2.2), in this objective, biodiversity is limited to the diversity between species at the species level, i.e. species richness. Previous studies engaging with the social dimension of biodiversity often focused on the species level (Qiu, Lindberg and Nielsen, 2013; Fischer *et al.*, 2018). Furthermore, the species level of biodiversity matters most for biodiversity conservation (Fischer *et al.*, 2018). The research questions are

1. Does the public appreciate biodiversity in urban parks?

The question first tries to comprehend whether the public prefers higher levels of biodiversity in urban parks. The answer to this question helps the understanding of whether the public supports relevant biodiversity-friendly park policies and practices promoting higher levels of biodiversity in urban parks.

2. What is the importance of biodiversity in urban parks compared to other park attributes?

This question sees biodiversity as a park attribute and aims to uncover how the public values biodiversity versus other relevant park attributes.⁵ It is possible that the public appreciates biodiversity, but they may also value other park attributes more than biodiversity. Hence, it is necessary to understand the importance of biodiversity relative to other park attributes. The answer to this question provides more nuanced and detailed insights

⁵ The other relevant park attributes were generated from focus groups (see Section 4.3.3).

and implications for biodiversity-friendly park practices in China. It can help identify whether the public deems that biodiversity conservation/enhancement should be prioritised, offering decision-makers implications about the trade-offs between biodiversity and other park attributes.

3. What are the interactions between public preferences for biodiversity and for other park attributes?

This question focuses on the relationship between preferences for biodiversity and for other relevant park attributes. For example, if the public desires rich biodiversity, is this desire accompanied by a greater preference for a low-intensive maintenance manner and wild-looking park appearance? This question can specifically enrich our understanding of mind models/pictures of biodiversity in urban parks.

Research objective 2:

Though biodiversity can exist in well-maintained, neat-looking parks, emphasising biodiversity conservation/enhancement in Chinese urban park design tends to create a park style with a wilder, less manicured appearance: the wild park style. Preferences for biodiversity at the species level (the first research objective) may not represent preferences for wild parks at a larger spatial level, i.e. the ecosystem level. This research objective aims to explore public perceptions of and preferences for the wild park style in contrast to the traditional park style. The research questions are

4. How does the public perceive wild and traditional parks?

This question examines public perceptions and experiences of wild parks in contrast to traditional parks. In particular, this question aims to comprehend public experiential interactions with, and the underlying meanings and values residents attach to the two park styles rather than mere visual

perceptions.

5. *Between the wild and traditional park styles, which one is preferred by the public and why?*

This question examines public preferences between the wild versus traditional park styles and the reasons/motivations behind the preferences. Understanding public preferences for the two different park styles is important for decision-makers to evaluate the attractiveness of the novel wild park style in China.

6. *What environmental interventions would enhance public preferences for wild parks?*

This examines public perceptions of specific environmental interventions and changes that can make wild parks more favourable. The answer to this question can provide planners, designers and managers with practical information on how best to intervene to maximise wild park preferences.

Objective 3:

To examine the preferences for park biodiversity and for the wild park style between different sociocultural groups among the public, and between the public and ecology/landscape professionals. The research question is

7. *How do preferences for park biodiversity and for the wild park style vary between different sociocultural groups among the public, and between the public and professionals?*

This question examines how preferences for biodiversity and for the wild park style vary between different groups of the public, focusing on gender, age, education, childhood living environment (rural versus urban), knowledge/interest in nature/parks/ecology, city of residence, and residential context (city core versus urban periphery). Moreover, this

question also compares public versus ecology/landscape professional views regarding preferences for biodiversity and for the wild park style.

4.3 Research methodology

To build a suitable research methodology for answering the above-mentioned research questions, it is important to have the following two issues in mind:

1. What research strategy and research methods are appropriate for this study? How and where should they be conducted?
2. What are the specific important points with regard to the application of each research method, e.g. preparatory work and design, sampling, administration and analysis?

Section 4.3 addresses the first question, and the second question is addressed in Sections 4.4, 4.5 and 4.6.

4.3.1 Case study research and selection: Hangzhou and Shanghai

The case study approach was identified as the main research strategy in this study. Yin (2009) proposed three criteria for defining the appropriate use situations of the case study approach: 1) when the research questions are how or why questions, 2) when the research lacks control over the events, and 3) when the research is about a contemporary phenomenon within a real-life context. This research covered these three criteria by stressing that 1) the research mainly deals with how the public in China perceives and experiences the biodiversity-friendly park approach, 2) the objective of this research is not prone to much control, and 3) the research is about a real-life contemporary issue of the Chinese social context of the biodiversity-friendly park approach.

Therefore, the case study approach was justified as the appropriate overall research strategy to support the study design. Deming and Swaffield (2011) noted that the case study approach is suitable for landscape architecture research involving humans because

“...landscape is a complex phenomenon that is very hard to break up into pieces in order to investigate using experimental techniques – particularly as it involves people and social relationships as well as biophysical relationships. In situations where the subject of research is complex and involves the interaction of both human and biophysical relationships, many applied disciplines adopt a case-study strategy.” (Deming and Swaffield, 2011, p. 80)

This study used comparative cases to compare the research interest in two different Chinese cities. Comparative case studies have been used by many scholars to obtain insights into research issues in different areas, cities or regions (Lima, 2016; Mathey *et al.*, 2018). Few Chinese studies on the subject of public responses to biodiversity and ecological landscape practices have used comparative case studies. In this research, the same corresponding research methods were conducted/replicated in both case studies. The comparison of case studies may not be reliable if the research methods are applied differently (Francis, 2001).

Yin (2009) stated that choosing the cases that represent the phenomenon/issue/problem to be researched is important. In this study, two Chinese cities, Hangzhou and Shanghai, offered a relatively appropriate context for obtaining reliable information with regard to the research objective and also for providing the possibility of comparison. Hangzhou and Shanghai were selected on the basis of the following criteria:

- The selected cities/areas/regions have a relatively strong contextual background of the ecological, biodiversity-friendly park approach.
- The selected cities/areas/regions' local people's opinion regarding the ecological, biodiversity-friendly park approach has not been addressed.

- The selected cities/areas/regions have different geographical, climatic or sociocultural contexts, which permit a comparison.

Regarding the first criterion, it is important to identify the distribution of biodiversity-friendly park practices in Chinese cities. In 2019, this research carried out a search of Chinese biodiversity-friendly urban park practices in relevant journals, books and online databases. Five criteria were used to select biodiversity-friendly urban park projects:

- The project is a public urban park that can be used by people.
- Ecological conservation and/or restoration and, in particular, biodiversity improvement are emphasised in the project's design. Biodiversity-friendly measures, such as habitat conservation or restoration, the use of native species or rewilding, are used in the design.
- The project exclusively intended for human use and other anthropocentric purposes were omitted.
- Park construction and development are completed.
- Project information in English/Chinese is available.

Based on these criteria, 51 biodiversity-friendly urban park projects in China were identified and mapped out (Figure 4.1). It can be seen that biodiversity-friendly park practices are on a very small scale in Chinese cities, with the majority located in relatively developed regions, such as the Yangtze River Delta (East China) and Pearl River Delta (South China). Specific information regarding these projects can be found in Appendix B-1.

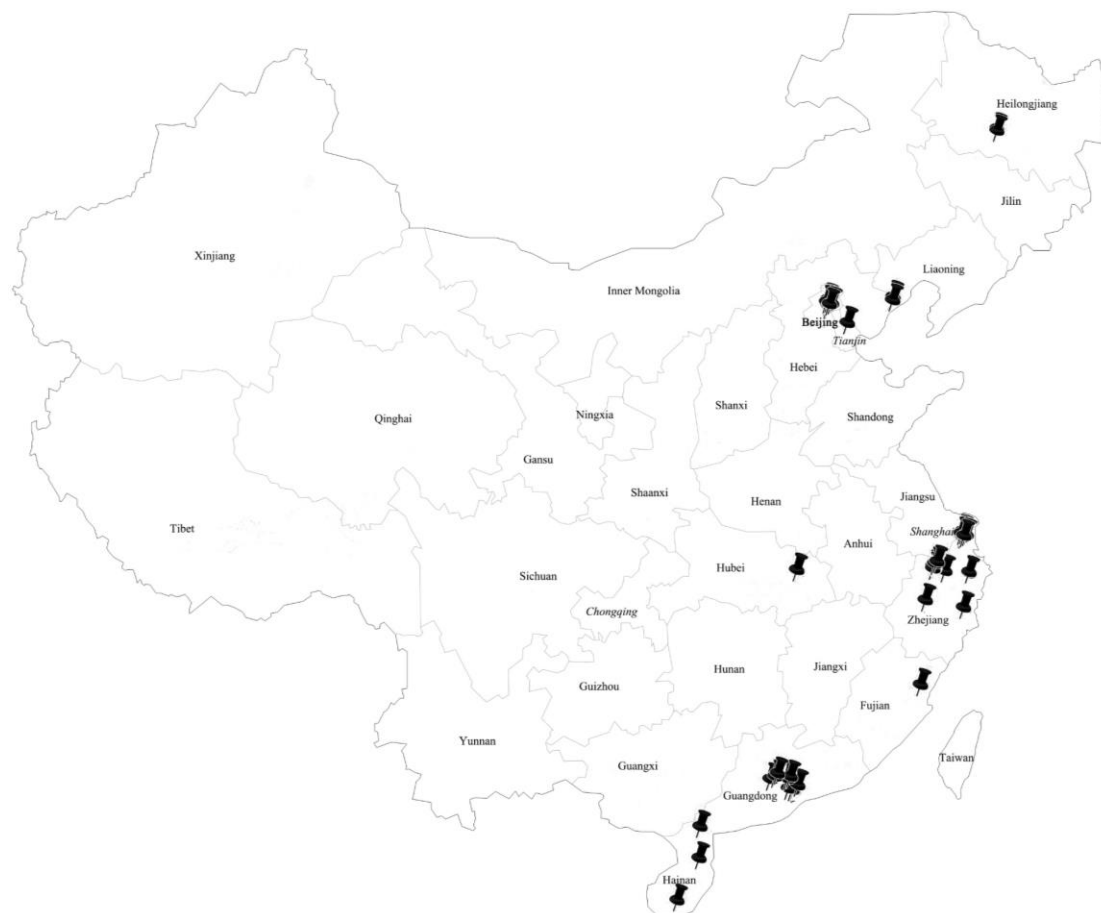


Figure 4.1 Mapping biodiversity-friendly urban park projects in China (summarised by the author. Black tag represents one biodiversity-friendly park project)

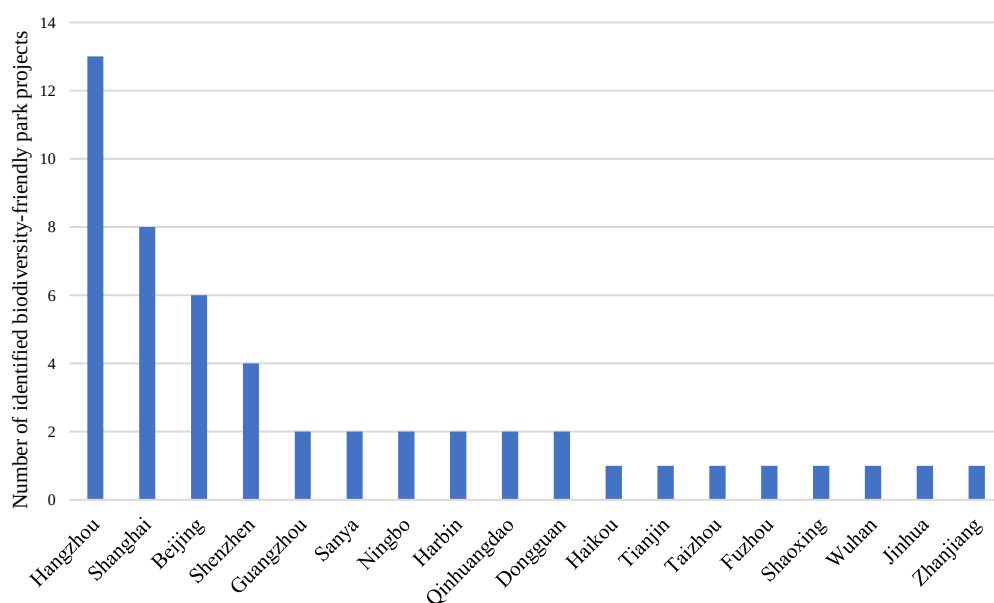


Figure 4.2 Number of biodiversity-friendly park projects in different Chinese cities

As seen in Figures 4.1 and 4.2, Hangzhou and Shanghai have more biodiversity-friendly park projects compared with other Chinese cities. The majority of the two cities' projects have a wild, naturalistic character, which differs from the traditional parks in the two cities. Indeed, it is extensively recognised that the development of ecological and biodiverse urban greenery in Hangzhou and Shanghai is relatively advanced in China (Chen, 2013). Moreover, the temporal legitimacy of biodiversity-friendly urban greenery is strong in Hangzhou and Shanghai, which is reflected in a series of urban greening policies initiated by the two cities (Sections 4.3.1.1 and 4.3.1.2).

Despite the contextual and temporal legitimacy of the biodiversity-friendly park approach, public engagement with biodiversity and related landscape practices is lacking and has received scant attention in Hangzhou and Shanghai.⁶ Based on the second criterion of case study selection used in this research (i.e. lack of research on local people's opinions), Hangzhou and Shanghai were suitable cases for this research.

Regarding the third criterion that the selected cases have different geographical, climatic or sociocultural contexts to permit a comparison, Hangzhou and Shanghai are both located in East China, and they are not very geographically and climatically different. Yet the two cities have different socioeconomic contexts. Shanghai is an international, compact city. It is a direct-administered municipality and a major economic centre in China. By contrast, Hangzhou is in Zhejiang Province and lags behind Shanghai in the aspects of urban and economic development. In this sense, the differences between the two cities could also provide a broader insight into the research topic. Below is a detailed introduction to Hangzhou and Shanghai.

⁶ The literature review revealed that only one study has investigated Hangzhou public preferences for biodiversity in a specific urban park (Yang, 2021a).

4.3.1.1 Hangzhou

Hangzhou is the capital and most populous city of Zhejiang Province. Located in East China, it sits at the head of Hangzhou Bay. By the end of 2019, the population of permanent residents in Hangzhou was 10.36 million (HMSB, 2020). Within the Hangzhou region, there are 10 local administrative districts, two counties (Tonglu and Chun'an) and one county-level city (Jiande) with a total area of 16,850 km² (HMSB, 2020). According to *Hangzhou Urban Master Plan (2001–2020)* (Hangzhou Municipal Government, 2001), Hangzhou's urban region has eight administrative districts, including Shang Cheng, Xia Cheng, Jiang Gan, Gong Shu, Xi Hu, Bin Jiang, Xiao Shan and Yu Hang (Figure 4.3). This study focused on Hangzhou's urban region, and the rural areas (two administrative districts, two counties and one county-level city) were excluded. Hangzhou's urban region also includes five city core districts, namely Shang Cheng, Xia Cheng, Jiang Gan, Gong Shu and Xi Hu, and three urban periphery districts, namely Bin Jiang, Xiao Shan and Yu Hang.

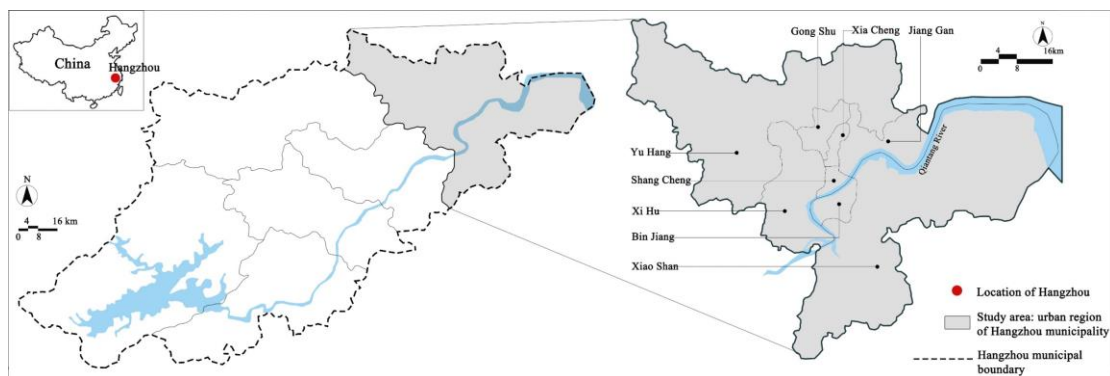


Figure 4.3 Map of Hangzhou's urban region (drawn by the author)

West Lake, a UNESCO World Heritage Site and a significant part of Chinese classical landscape architecture, is located on the western side of Hangzhou's city core area (Figure 4.4). As a scenic spot, West Lake is well known for its pictorial beauty and mountain–water aesthetic associated with Chinese landscape paintings and gardens (Duan, 2020). Within and around West Lake today, there are numerous classical garden elements, such as pavilions,

temples, pagodas and ornamental trees and plants as well as causeways and artificial islands (UNESCO, 2011) (Figure 4.5).

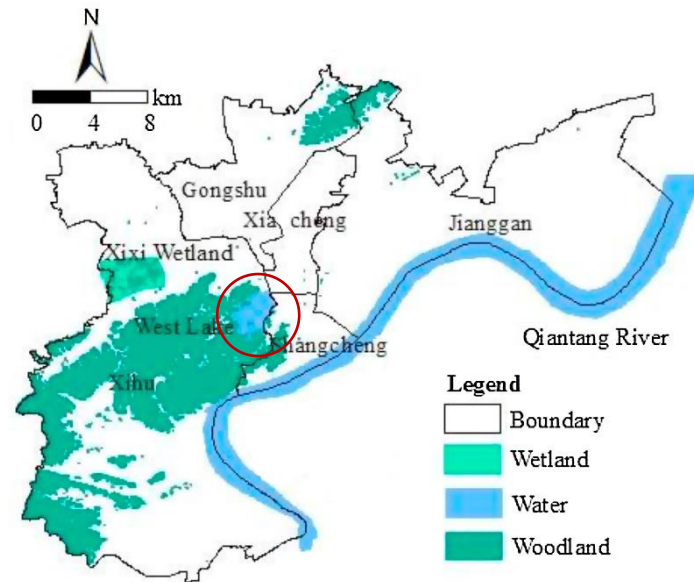


Figure 4.4 Location of West Lake in Hangzhou's city core area. The image is modified based on Du and Huang (2017). The red circle indicates West Lake



Figure 4.5 West Lake (photographed by the author)

At the beginning of the foundation of the People's Republic of China in 1949, some modern public parks were constructed around West Lake. Most of them

(e.g. Fish Viewing Harbour Park) combined both classical garden and Western garden traditions using the *Garden within Garden* strategy (Section 2.4.1). During the 1980s and 1990s, park design was primarily driven by an anthropocentric vision. Elements such as lawns (with single-tired trees), flowerbeds, squares and amenities (Figure 4.6) were largely incorporated and sometimes mixed with classical garden elements (e.g. rocks and pavilions) (Xia *et al.*, 2007; Chen, Li and Bao, 2008).



Figure 4.6 Lawns, flowerbeds, and squares and facilities in Hangzhou's urban parks. The top image is from the author and the bottom image is from Ru, Yang and Zhang (2015)

Hangzhou is rich in urban woodland and wetland ecosystems (Du and Huang, 2018). The woody plant species richness of urban woodlands in Hangzhou ranked fourth among 257 Chinese cities (Yan and Yang, 2017). However,

urbanisation since the 1980s has destroyed or damaged many urban natural ecosystems. Consequently, Hangzhou's natural grassland change rate was as high as 70% from 2000 to 2010 (Zhang, Song and Da, 2020). In response to the deterioration of its urban ecosystems, Hangzhou has made an effort towards incorporating ecological and biodiversity concepts in UGS planning and design. Policies such as *Key Points of Natural Ecological Protection in Hangzhou (2020)* (HMEEB, 2020) and *Action Plan for High-level Promotion of Land Greening and Beautification in Hangzhou (2019–2022)* (Hangzhou Municipal Government, 2019) indicate that biodiversity enhancement is the focus in UGS planning and design. *Hangzhou Green Space System Plan (2021–2035)* (HMBGCR, 2021) states that more than 150 new urban parks will be built by 2035, and the ecological, biodiversity-friendly model will be considered the principal approach.

Many Hangzhou biodiversity-friendly, wild park projects were built by conserving woodlands and wetlands (including pristine Nature 1 and novel Nature 4) and making them accessible to people. These wild parks (Figure 4.7) are integrated into Hangzhou's urban BGI, which includes urban trees, community gardens, traditional parks, West Lake, Qiantang River, Grand Canal and mountain nature reserves in and around Hangzhou (HMBGCR, 2021).



Figure 4.7 Wild parks in Hangzhou: Changqiao Xishui Ecological Restoration Park (left) and Jiangyangfan Eco-Park (right) (photographed by the author)

4.3.1.2 Shanghai

Shanghai is one of the most densely populated cities in China, with a population of 24.28 million as of 2019 (SMSB, 2019). Shanghai is a direct-administered municipality and does not belong to any province. The city is located at the confluence of the shoreline of the East China Sea and the Yangtze River, with the Huangpu River flowing through it. Shanghai harbours 16 administrative districts within an area of 6,340 km² (SMSB, 2019). *Shanghai Urban Master Plan (2017–2035)* (Shanghai Municipal Government, 2018) defines 10 districts, namely Huang Pu, Xu Hui, Chang Ning, Jing An, Pu Tuo, Hong Kou, Yang Pu, the subdistrict of Min Hang, the subdistrict of Bao Shan and the subdistrict of Pu Dong, as Shanghai's urban region (Figure 4.8). As with Hangzhou, this research focused on Shanghai's urban region.

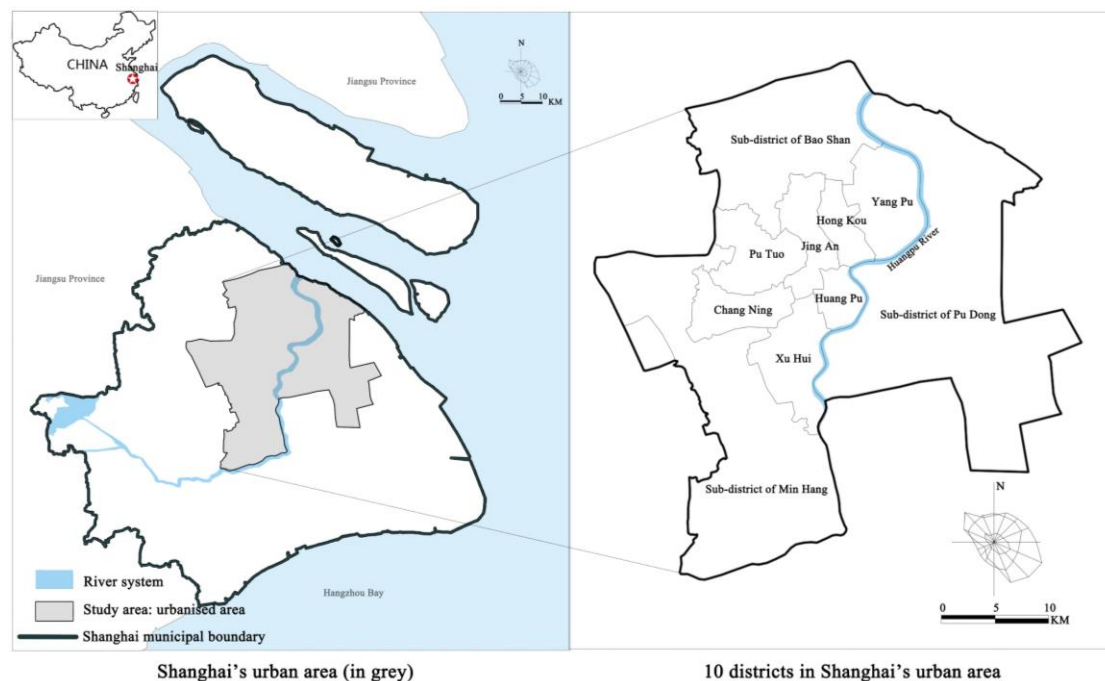


Figure 4.8 Map of Shanghai's urban region (drawn by the author)

When parks were constructed in the Shanghai International Settlement in 1842, the Western idea of the public park was introduced to this city. These public parks predominantly applied a Western traditional park approach. Since the

Economic Reform in 1978, Shanghai has experienced an increase in the number of urban parks – from 45 to 165 between 1980 and 2015 (Wu *et al.*, 2019) – in parallel with the urbanisation boom. The area of urban land in Shanghai increased from 159.1 km² in 1975 to 1,179.3 km² in 2005 (Zhao *et al.*, 2006). The use of lawns, flowerbeds and exotic plants in Shanghai's parks has grown at great speed (Figure 4.9) along with the domination of concrete pavement, monuments and entertainment facilities, shaping Shanghai's traditional park style.



Figure 4.9 Lawns in Century Park (left) and carpet flowerbed in Lujiazui Green Space (right) (photographed by the author)

While Shanghai has seen rapid urbanisation and the increase of traditional parks, biodiversity loss and other environmental problems have caused concerns. Accordingly, *Shanghai Urban Master Plan (2017–2035)* proposes that an immediate imperative is to explore “a new growth model that is suitable for promoting the ecological development of densely populated megacities” (Gan, 2021, p. 39). *The Shanghai Biodiversity Conservation Strategy and Action Plan (2012–2030)* (SHMBEE, 2013) proposes that restoring/conserving wildlife habitats and woodlands and tree resources should be the priority of UGS practices, and biodiversity in Shanghai should be effectively restored/conserved by 2030.

Shanghai's wild park projects (Figure 4.10) largely focus on the restoration of native wetlands and forests, and some of them function as environmental education centres and stormwater infrastructure. Recently, local planners and ecologists (e.g. Liangjun Da and Taoran Guo) have been working on rewilding and creating biodiverse green corridors and green roofs, aiming to construct a biodiversity network within the megacity.



Figure 4.10 Wild parks in Shanghai: Jinhai Wetland Park (left) and Mengqing Eco-friendly Park (right) (photographed by the author)

4.3.2 A mixed-method study

Chapter 3 discusses the methods used for conducting research on the social dimension of urban biodiversity and wild UGSs (Sections 3.4–3.7). Table 4.1 summarises the main methods used by previous studies.

In this study, the use of behaviour observation was not an option, since it mainly deals with how people use and behave in a specific environment setting (Moore and Cosco, 2010) rather than people's mental perceptions, views and experiences. Visitor-employed photography (VEP) asks participants to take photos to describe the environment (Cherem and Driver, 1983). However, VEP is constrained by its resource intensiveness in terms of time consumption and

expense (Chenoweth, 1984). Thus, it was excluded from the study. Initially, this research selected go-along interviews as one method and tested their suitability in a pilot study in April 2020. I tried to recruit participants to join the go-along interviews. Unfortunately, the response rate was very low. Considering the difficulty in conducting go-along interviews practically, this method was excluded.

Table 4.1 Summary of main methods used for investigating perceptions of and preferences for urban biodiversity and wild UGSs

Research methods		Examples of studies
Questionnaire	Photo-based questionnaire or participants observe photos/slides and complete questionnaires/tasks	(Nassauer, Wang and Dayrell, 2009) (Zheng, Zhang and Chen, 2011) (Hofmann <i>et al.</i> , 2012) (Fischer <i>et al.</i> , 2018) (Fischer <i>et al.</i> , 2020)
	Text-based questionnaire	Using actual sites: (Gyllin and Grahn, 2005) (Ozguner and Kendle, 2006) Not using actual sites: (Jim and Chen, 2006a)
	Conjoint analysis questionnaire/choice experiment/stated preference	(Gobster <i>et al.</i> , 2021)
Interview		(Campbell-Arvai, 2019) (Colley, Brown and Montarzino, 2016)
Focus group		(Bell, Ward Thompson and Travlou, 2003) (Fischer and Young, 2007)
Behaviour observation		(Palliwoda, Kowarik and von der Lippe, 2017) (with biodiversity analysis and interviews)
Visitor-employed photography (VEP)		(Qiu, Lindberg and Nielsen, 2013)
Mixed-method study		(Jorgensen, Hitchmough and Dunnett, 2007) (Ignatieva <i>et al.</i> , 2017) (Yang <i>et al.</i> , 2019b)

Finally, this study applied qualitative focus groups, quantitative questionnaires and qualitative interviews as a mixed method research strategy. As for the

questionnaire, this research used a novel conjoint analysis questionnaire. Conjoint analysis is a form of discrete choice experiment (Ward Thompson, 2016). The reasons for using conjoint analysis are:

- 1) Conjoint analysis has the advantage in that it is a powerful tool for quantifying and anticipating people's priorities and preferences for an object. It is particularly useful for understanding the respondents' preferences for biodiversity as a park attribute (research objective 1). Compared with conventional questionnaires/interviews that ask each attribute in a separate and direct way, conjoint analysis works in a de-compositional way by examining the joint effects of attributes, which seems to be closer to the way people make trade-offs and decisions in real life (see Section 4.5.1 for details). In the words of Aspinall,

“conjoint always presents each component in a choice task in a varying context of other components so that typical biases inherent in the relative nature of perception and choice are minimised.” (Aspinall, 2010, p. 204)

- 2) Conjoint analysis generates park scenario preferences and individual-level preference heterogeneity and subgroup preferences, which could appropriately address research objectives 2 and 3. Conjoint analysis produces

“a dynamic tool that can be used to model different scenarios, both for the sample as a whole and for sub-samples...” (Ward Thompson, 2016, p. 252)

Such scenario modelling can provide data for planners and designers concerned with how best to intervene in an existing situation to maximise park preferences and bring about positive changes.

- 3) Its application in the fields of landscape/conservation/environmental psychology in China receives scant attention. The use of conjoint analysis in this study may provide insights into the application of this method in relevant Chinese research.

This study adopted both qualitative and quantitative research methods. While

there is a range of differences between qualitative and quantitative methods, mixing the two allows the comparison of the results from one method with those from another, enables them to complement each other, permits the combination of the strengths of different methods, and bridges their respective weaknesses, which helps to provide a comprehensive picture (Creswell, 2009; Lima, 2016). Mixing qualitative and quantitative methods is associated with the strategy of triangulation, i.e. combining different methods in one research, which ensures cross-validation, avoids the possible bias of one single method, and allows a holistic picture of a study (Creswell, 2009).

4.3.3 Research procedure

What form should mixed-method research take, and how should it be conducted in what procedure? According to Johnson and Onwuegbuzie (2004), the findings from the quantitative and qualitative methods must be mixed or integrated at some point to be considered a mixed method study. The empirical research structure shown in Figure 4.11 presents the relationship between the three methods used in this mixed-method study and how the relevant outputs from one method/phase gradually influenced the others. Within this structure, the empirical research proceeded from top to bottom, left to right. This structure shows that the three methods were related to each other, and the relevant findings from the previous method/phase fed the next method/phase in a linear manner. Specifically, the mixed method design in this research involved three phases: the relevant findings from the Phase I focus groups helped to identify the key issues, which were then used for designing the Phase II conjoint analysis, and then Phase III semi-structured interviews with volunteer respondents who were involved in the conjoint analysis were conducted to explore in further detail the notable findings from the Phase II conjoint analysis (also to obtain more in-depth information and cover issues not previously

addressed) (Figure 4.11). In answering the research questions and addressing the main research question, the findings from all the research methods were then interpreted with the triangulation strategy.

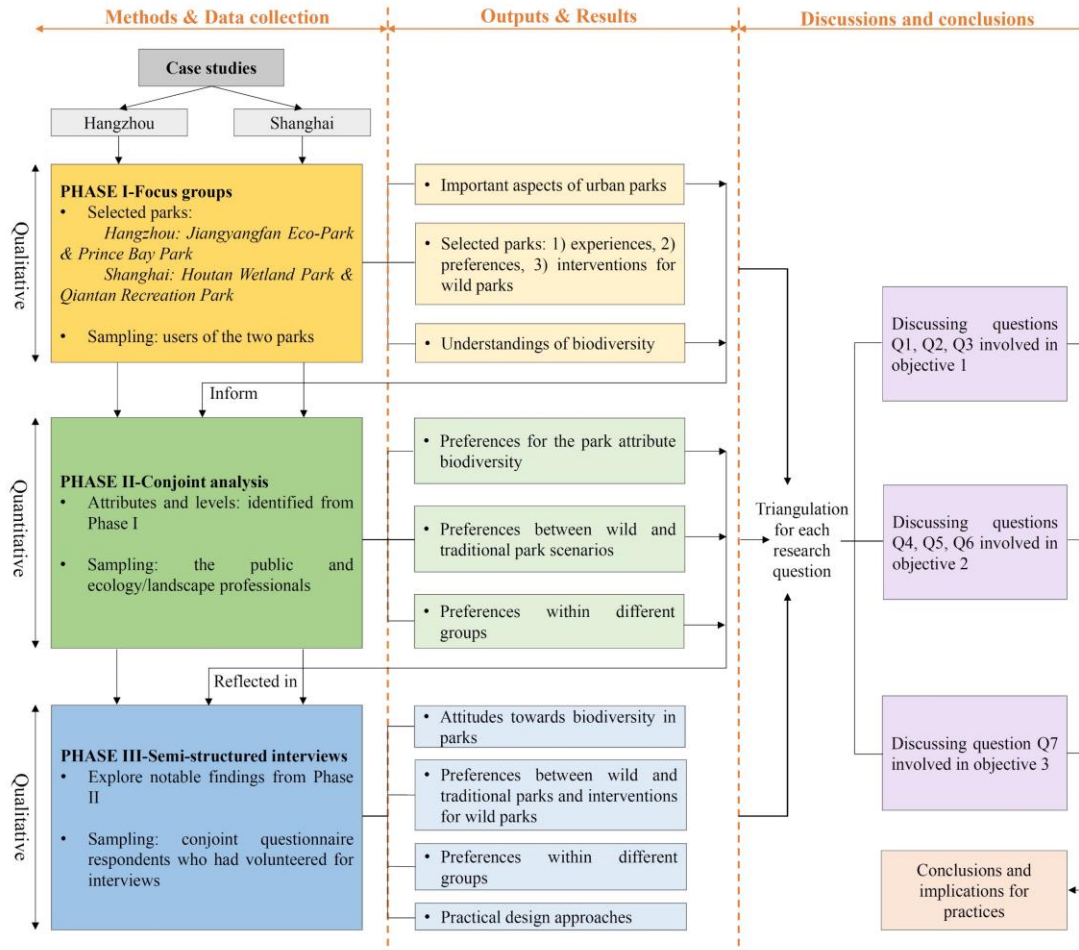


Figure 4.11 Structure of the methodology, results and discussions in this study

Specifically, Phase I consisted of focus groups with local residents in Hangzhou and Shanghai. In each city, focus groups were used to gather qualitative information from users of the selected wild and traditional park sites about their attitudes towards urban parks and different park styles as well as their mental constructs of biodiversity (main outputs) (Figure 4.11). Relevant results (mainly outputs of the important aspects of urban parks and understanding of biodiversity) provided the basis for generating the relevant park attributes in order to inform the design of Phase II conjoint analysis (Figure 4.11).

Quantitative Phase II conjoint analysis was carried out based on the relevant findings from the previous focus groups. The two-phase procedure, i.e. qualitative interviews or focus groups followed by quantitative conjoint analysis, has been used before (Aspinall, 2010; Lima, 2016; Stanton, 2016). The outputs of the conjoint analysis quantitatively addressed the three research objectives. The attributes and levels used for the conjoint analysis were generated from the relevant data of the focus groups (the attribute “biodiversity” was first set because it is the research interest attribute). Conjoint analysis was conducted in both Hangzhou and Shanghai with a larger sample of people, including the public and ecology/landscape professionals.

Phase III comprised semi-structured, in-depth interviews with volunteer public and professional respondents who participated in the conjoint analysis. Some notable findings from the conjoint analysis were reflected in further detail in the interviews in order to obtain a more in-depth understanding of the research subject. The interviews with the professionals also revealed some practical biodiversity-friendly design issues that the planners and designers cared about.

Table 4.2 below presents what the three different methods offered in relation to addressing the research questions.

Table 4.2 What the different methods offer to address the research questions (for each research question, the underlined bold texts indicate the main methods used, and bold texts without underlines represent methods that can provide information for interpretation/verification)

Research question	What is offered by the methods
Does the public appreciate biodiversity in urban parks?	The output of utility values generated from <u>conjoint analysis</u> quantitatively identified whether the public preferred higher levels of biodiversity in urban parks. Relevant data from focus groups and interviews helped to interpret/check the findings from conjoint analysis.
What is the importance of biodiversity in urban parks compared to other park attributes?	<u>Conjoint analysis</u> quantitatively revealed the importance of the attribute “biodiversity” compared with other park attributes. Relevant data from focus groups and interviews helped to explain the findings from conjoint analysis in order to understand the reasons behind the perceptions of the relative importance of biodiversity.
What are the interactions between public preferences for biodiversity and for other park attributes?	Correlation analysis using data from <u>conjoint analysis</u> revealed preferences for biodiversity and for other park attributes. Interviews also helped to interpret the data from conjoint analysis.
How does the public perceive wild and traditional parks?	<u>Focus groups</u> and <u>interviews</u> revealed how the public perceived and experienced wild and traditional park sites (focus groups used selected actual sites to represent the two park styles, whereas interviews used manipulated photos). Related questions about wild and traditional park sites (selected actual sites) in the conjoint analysis questionnaire provided additional information.
Between the wild and traditional park styles, which one is preferred by the public and why?	<u>Conjoint analysis</u> quantitatively examined public preferences for wild versus traditional park scenarios. Focus groups and interviews also provided additional information.
What environmental interventions would enhance public preferences for wild parks?	<u>Conjoint analysis</u> identified changes in the wild park scenario that can be effective to bring about positive preference enhancement. <u>Focus groups</u> and <u>interviews</u> revealed the public’s desired improvements to wild parks.
How do preferences for park biodiversity and for the wild park style vary between different sociocultural groups among the public and between the public and professionals?	<u>Conjoint analysis</u> produced statistical results regarding subgroups’ preferences for the attribute “biodiversity” and for the wild park scenario. Where applicable, focus groups and interviews helped to explain the relevant findings from conjoint analysis.

4.3.4 Ethics

I submitted the Edinburgh College of Art (ECA) online Self-Audit Checklist for Ethical Purposes (Level 1), and it was approved by the ECA Ethics Committee of the University of Edinburgh in November 2019. The beginning of data collection met with the outbreak of the COVID-19 pandemic. While research activities were encouraged to be undertaken using digital methods, in ECA, face-to-face research activities were permitted subject to the necessary risk assessments and updated ethical checklist being completed and approved by ECA staff and the ECA Ethics Committee. After completing the relevant risk assessments and updated ethical checklist, face-to-face data collection activities for this research were permitted.

In relation to focus groups and semi-structured interviews, I distributed a written consent form for protecting the anonymity and confidentiality of all participants. Each participant agreed to sign the form. Each interview/focus group discussion was sound-recorded with the permission of all participants. With regard to the conjoint questionnaire, the aims of the study and ethical issues, including confidentiality, data storage and usage (securely and used only for academic purposes), and the ethical approval by the ECA Ethics Committee for this research were provided at the beginning of the questionnaire.

4.4 Focus groups

4.4.1 Focus groups

As a qualitative research method, focus groups are very useful to obtain an in-depth understanding and knowledge of the research phenomenon/issue/problem and gather different people's views and

experiences. Group members not only respond to group discussion questions posed by the moderator but may also comment on other members' responses (Gomm, 2008).

Specifically, the focus groups in this study aimed to determine 1) what aspects/attributes of urban parks are important to the residents, 2) how residents perceive the selected wild and traditional park sites, 3) what the residents would like to see changed with regard to the selected wild park sites, 4) the residents' preferences for the selected wild versus traditional park sites and 5) how the residents perceive the notion of biodiversity.

4.4.2 Selection of wild and traditional park sites in Hangzhou and Shanghai

Understanding how the public perceives and evaluates wild and traditional park styles is one purpose for the use of focus groups. This research selected actual wild and traditional park sites in each city to represent the two park styles. It is crucial that the selected sites represent the two park styles adequately. Furthermore, the two sites with different styles should be approximately similar in size and in the same area in order to eliminate the possible effects of park size and distance on perceptions and preferences (Ozguner and Kendle, 2006). The wild park sites were selected from the previously identified biodiversity-friendly park projects. Finally, in Hangzhou, Jiangyangfan Eco-Park was selected as the wild park site, and Prince Bay Park was selected as the traditional park site. In Shanghai, Houtan Wetland Park was selected as the wild park site, and Qiantan Recreation Park was selected as the traditional park site. Below is a detailed introduction to these four park sites.

4.4.2.1 *Jiangyangfan Eco-Park and Prince Bay Park in Hangzhou*

Both Jiangyangfan Eco-Park and Prince Bay Park are located in Hangzhou's Shang Cheng district (Figure 4.12). The two park sites are approximately similar in size (Jiangyangfan Eco-Park: 19.8 hm², Prince Bay Park: 17.5 km²).

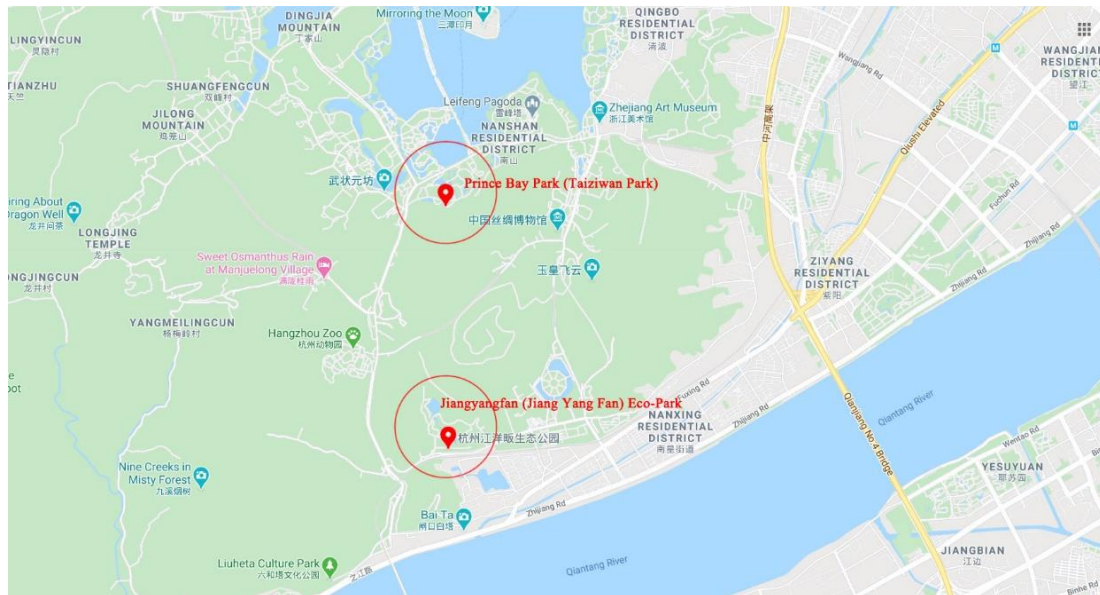


Figure 4.12 Locations of Jiangyangfan Eco-Park and Prince Bay Park in Hangzhou (map retrieved from www.google.no/maps/)

- Jiangyangfan Eco-Park, Hangzhou

Located near West Lake, the original site of Jiangyangfan Eco-Park was a novel Nature 4 ecosystem (Figure 4.13). Between 1999 and 2008, the original site experienced an evolution from a low-lying wasteland containing sludge dug from West Lake to a wild habitat with willow-dominant woodland swamp landscapes (Figure 4.14). Ecological surveys found nearly 80 plant species in 2009 before the construction of a new park (Quan, Zhang and Gao, 2022).



Figure 4.13 A novel urban ecosystem (Nature 4) before the park construction (UED, 2013)



Figure 4.14 The site's natural succession process from 2000 to 2008 (Beijing Forestry University School of Landscape Architecture, 2018)

In 2008, the idea of creating an ecological park on the site was proposed, and the park was built in 2010. The Atelier DYJG company was responsible for this project. Their design was inspired by the existing novel ecosystem to conserve on-site biodiversity in which the spontaneous habitat formed the whole basis for the design. Well-growing parts of the spontaneous woodlands were preserved without interventions as *Habitat Island* (Figures 4.15a and b). Dead wood and trees and spontaneous wetlands were retained (Figures 4.15c and d). Some understory vegetation, like plants used as nectar sources, were introduced at a proper scale. A raised pontoon boardwalk with platforms and

benches was built to provide people with access to the wild environment without direct impact on the vegetation (Figures 4.15e and f).



Figure 4.15 Jiangyangfan Eco-Park. (a) and (b) *Habitat Island*, (c) dead wood and trees, (d) spontaneous wetlands, (e) a raised pontoon boardwalk and (f) a boardwalk with platforms and benches (photographed by the author)

Jiangyangfan Eco-Park and its surrounding green spaces form an important UGS system in Hangzhou. This large UGS system provides a wealth of regulating, supporting, provisioning and cultural ecosystem services. Surveys

have reported the role of Jiangyangfan Eco-Park in supporting urban biodiversity: the park harbours 213 plant species, 45 bird species, and 56 butterfly species (Huang, 2015).

- Prince Bay Park, Hangzhou



(a)



(b)



(c)



(d)



(e)



(f)

Figure 4.16 Prince Bay Park. (a) lawns with some trees, (b) lawns, (c) rose garden in Prince Bay Park, (d) rocks used to define a pavement edge, (e) tulips, (f) Japanese Tokyo cherry trees and flowerbeds (the last two are from <https://map.baidu.com/>. The other images are from the author)

Prince Bay Park is located near West Lake. Led by Hangzhou Landscape Design Institute in 1987, the park's design referred more to ornamental and horticultural considerations rather than ecological principles (Liu, 1990). The park is dominated by large-scale lawns with emergent trees, ornamental plantings and flowerbeds (especially tulips) and service buildings for playing and resting (Figure 4.16). It also has some classical garden elements, such as pavilions and rocks (Figure 4.16d). Notably, the park is famous as a scenic spot to view tulips and Japanese Tokyo cherry trees (Figures 4.16e and f) and is also a well-known wedding venue.

4.4.2.2 Houtan Wetland Park and Qiantan Recreation Park in Shanghai

Both Houtan Wetland Park and Qiantan Recreation Park are located in the densely populated Pu Dong district of Shanghai (Figure 4.17). Qiantan Recreation Park is a little bit larger than Houtan Wetland Park (Houtan Wetland Park: 13.43 hm², Qiantan Recreation Park: 26.64 hm²).

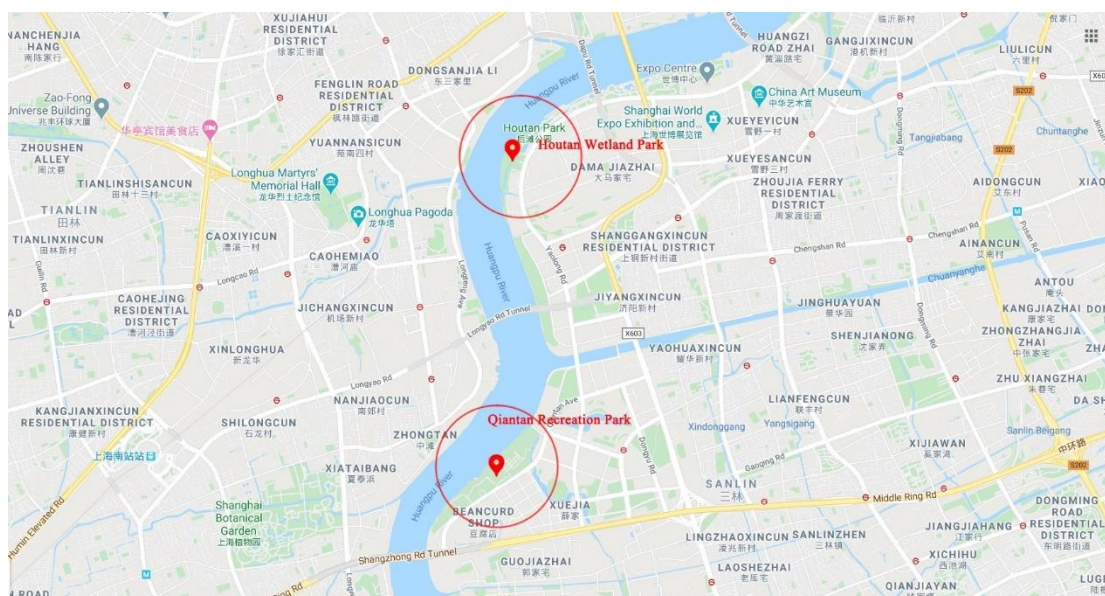


Figure 4.17 Locations of Houtan Wetland Park and Qiantan Recreation Park in Shanghai (map retrieved from www.google.no/maps/)

- Houtan Wetland Park, Shanghai

Located along the Huangpu River, the original site was a contaminated industrial wasteland with spontaneous vegetation and a remnant wild wetland (2.25 hm²), which harboured diverse plants and animals, including 138 plant species (Zhang *et al.*, 2007b) and 18 macrobenthic species (Zhang *et al.*, 2007a) (Figure 4.18).

Shanghai hosted Expo 2010, and this wildscape site was selected as the location for a park project for this event. The existing remnant wetland was regarded as a precious natural habitat in Shanghai, but it had been contaminated by former iron and steel works (Li, 2012). Having this challenge in mind, Turenscape's proposal stressed ecological design by retaining the remnant wetland (which was intentionally inaccessible) (Figures 4.19b and d) and constructing a new artificial wetland (Figure 4.19a). An extended wetland system with ecological water treatment technology and the enhancement of the remnant wetland ecosystem was established.



Figure 4.18 Remnant wild wetland (in 2007) before the park construction (Zhu and Chen, 2011)

Turenscape believed in the roles of the wetland system and ecological water treatment technology in purifying polluted Huangpu River water. The site's "layers of prior use" (Mclean, 2019, p. 26) were expressed in Turenscape's plan, including the pre-industrial farming use era evoked through filtration terraces

alongside selected industrial relics renovated and placed in a new context to function as symbols of the industrial era that also support visitors' usages.

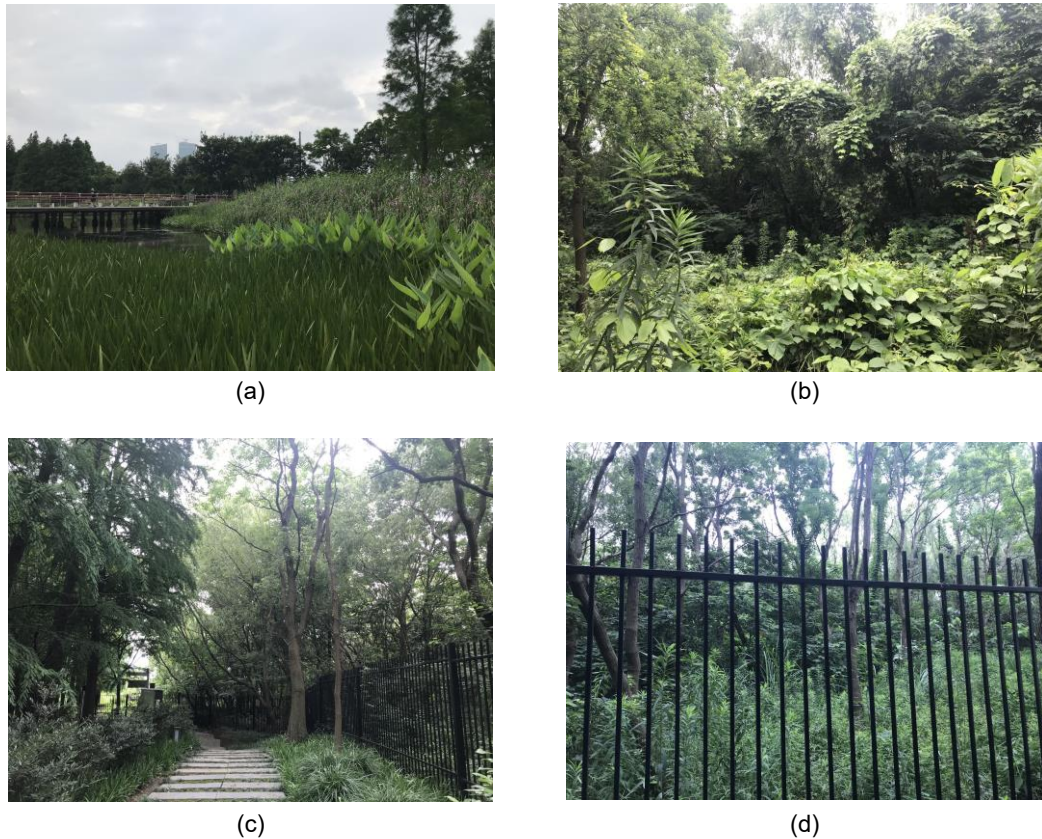


Figure 4.19 Houtan Wetland Park. (a) artificial wetland, (b) conserved remnant wetland, (c) a path near the conserved remnant wetland, (d) the conserved remnant wetland is inaccessible (photographed by the author)

Biodiversity surveys reported 165 new additional plant species and 137 new additional animal species in 2012 compared with the biodiversity situation of the original site (Turenscape, 2018). Houtan Wetland Park is a part of the linear BGI along the Huang River, functioning as a significant ecological spot and also connecting other riverside green spaces, such as Qiantan Recreation Park and Expo Park. This linear riverside green corridor is seen as fundamental in responding to many of Shanghai's urban problems, such as pollution and flooding.

- Qiantan Recreation Park, Shanghai

Both Qiantan Recreation Park and Houtan Wetland Park are constituent parts of a chain of public open spaces along the Huangpu River, which gives people access to open riverside spaces in highly dense urban Shanghai. Qiantan Recreation Park was originally a sector of a post-industrial site containing spontaneous plant communities and abandoned structures from former heavy industry. Informed by the *tabula rasa* approach, the park design did not retain or echo much of the original site's character. The park was designed mainly for ornamental and recreational purposes. The notable features in this park are the large-scale neat lawns and flowerbeds, the reuse of old brick and different recreation facilities and play areas (Figure 4.20). Plants are arranged in an orderly, uniform pattern, forming a neat and manicured park character.



(a)



(b)



(c)



(d)

Figure 4.20 Qiantan Recreation Park. (a) lawns and facilities, (b) flowerbeds and play areas, (c) flowerbeds, (d) the reuse of old brick as pavement and walls (photographed by the author)

4.4.3 Design of focus groups and sampling

The focus group schedule consisted of planned procedures and a topic guide of a set of semi-structured, open-ended interview questions. The interview questions for the focus groups were developed from the general, i.e. attitudes towards general public parks, to the specific, i.e. experiences of the two selected park sites. Closed and biased/leading questions (e.g. do you consider biodiversity of urban parks important?) were avoided so that the participants would not respond in a way they thought the moderator expected. Biodiversity-related words and phrases (e.g. biodiversity, species, diversity, wildlife and ecological value) were not mentioned directly by the moderator except towards the end of the discussions they did not come up spontaneously. The main discussed topics were (for detailed information, see Appendix B-2)

1. Environmental aspects (attributes) of urban parks that the participants considered important, which could influence their choices of preferred parks
2. Experiences of the selected wild and traditional park sites
3. Desired changes with regard to the wild park sites
4. Preferences for wild and traditional park sites

Note: This was only asked if the participants did not mention their preferences before.

5. Understanding of biodiversity

Note: If the participants mentioned biodiversity-related words and phrases (e.g. biodiversity, species, diversity, wildlife and ecological value) in the previous discussions, I immediately asked for details about biodiversity (e.g. whether they had heard of the term biodiversity, what came to mind when talking about this term, etc). If the participants still did not mention any biodiversity-related words and phrases by the end of the discussion, I directly asked about their understanding of biodiversity. All in all, if the related words and phrases did not come up spontaneously in the discussions, I only directly brought in biodiversity and posed questions

about it at the end to avoid leading the discussions.

Although focus groups were carried out following the planned schedule, the participants were encouraged to talk freely to express their views rather than just answering the questions posed.

For this study, I intended to recruit participants from each city's local residents who had visited and had impressions of the two selected park sites. They were the population who were able to convey their ideas about both sites, enabling a comparison between the two, which is one important research issue to be explored via focus groups. This sampling approach followed the research by Ozguner and Kendle (2006). The participants in each city were segmented into three age groups: older group (60 and over 60), middle-aged group (35–59) and younger adult group (18–34). The cut-off age chosen was in accordance with the census data of the two case study cities (HMSB, 2019; SMSB, 2019).

A pilot focus group was conducted in Shanghai in January 2020. A group of five Shanghai residents who had visited Houtan Wetland Park and Qiantan Recreation Park participated. The main aim of the pilot was to have a whole picture of how best to conduct focus groups in practice with considerations of issues like timing, whether the questions asked were clear, whether each participant had the chance to talk, how best to prompt the group discussion, etc. After the pilot, the planned scheme seemed feasible in general, and the number of five participants in one group was appropriate.

Yet there were several issues which should be addressed: 1) some participants were silent, while others led the discussion. Nizarudin (2017) suggested that improvisations can create a more responsive discussion, and it is thus productive to add improvising questions in conducting formal focus groups to

interact more with some silent participants, 2) the way to ask questions and prompt discussions in formal focus groups should be flexible and interactive without leading or directing participants' responses, 3) the pilot was planned to last for an hour, but after the pilot, three of the participants gave me feedback that they felt the length was too long. Considering that shortening the length may generate insufficient data (the data was not saturated), it was planned to conduct two focus groups per age group in each city in order to obtain enough data.

Regarding recruitment, I initially visited Jiangyangfan Eco-Park and asked the users if they had visited Prince Bay Park. If the users had visited Prince Bay Park, they were invited to focus groups. Unfortunately, most users refused the invitation. I then posted the focus group invitation via the social media Sina Weibo. In each city, I also contacted the staff and managers of the selected park sites as well as local community centres located near the two sites for their assistance. They were kindly cooperative in helping with the recruitment. With their help, I managed to recruit more participants. This, however, brought some limitations, since there may have been some biased selection of the participants. For example, in Shanghai, there was a dominance of participants living in one community/neighbourhood with very similar living conditions.

4.4.4 Conducting focus groups and participants

In Hangzhou, the focus groups took place at a meeting room and a tea house in the Shang Cheng district. In Shanghai, the focus groups were conducted at a coffee house and a discussion room at the community centre in Shang Nan Hua Cheng, a community near the two park sites.

At the beginning of the focus groups, the participants were provided with a brief

introduction to this research, the purposes of focus groups and some ethical issues, such as confidentiality. The participants were not told about this project's detailed information but were informed on a general topic, namely, their perceptions and views of urban parks. Furthermore, terms such as *traditional parks* and *wild parks* were omitted from the discussions, since the participants may not have been familiar with them and could have misunderstood them. Words like *traditional* and *wild* may also have negative or positive connotations for some people. Ethical consent forms and a questionnaire seeking the participants' sociocultural information were distributed. During discussions, I tried to ask for details such as *why* or *how* to go beyond some fixed ideas (Lima, 2016). Each discussion lasted about 40 minutes and was sound-recorded with the permission of the participants.

In late April and June 2020, six face-to-face focus groups, including two older groups, two middle-aged groups, and two younger adult groups, were conducted in Hangzhou. In June and July 2020, six face-to-face focus groups, including two older groups, two middle-aged groups, and two younger adult groups, were conducted in Shanghai. Each group had an average of five to seven participants, though there were only four participants in one older group in Hangzhou even after efforts to recruit more.

A total of 66 participants were interviewed (32 in Hangzhou, 34 in Shanghai) (Table 4.3). Overall, there were more females than males in each city. This might be because females showed more interest in participating in group discussions. Each age group involved an average of 11 participants. Most participants in the older groups had relatively lower education levels, whereas those in the younger adult groups had higher education levels. In each city, the majority of the participants in the middle-aged and older groups were married, and more than half of the participants in the younger adult groups were

single/other.⁷ The participants were from a variety of occupations, including state workers, corporate workers, self-employees and freelancers. The participants' work was not related to ecology/landscape.

Table 4.3 Profile of focus group participants by city (18–34 = younger adult group, 35–59 = middle-aged group, 60+ = older group, HS = high school or below, JC = junior college, UG = undergraduate degree and PG = postgraduate degree or higher)

		Hangzhou			Shanghai		
		18–34 (N=10)	35–59 (N=13)	60+ (N=9)	18–34 (N=10)	35–59 (N=12)	60+ (N=12)
Gender	Male	3	2	3	6	2	7
	Female	7	11	6	4	10	5
Education	HS	2	3	8	0	0	8
	JC	1	4	1	1	7	4
	UG	6	6	0	8	5	0
	PG	1	0	0	1	0	0
Marital status	Married	4	12	9	4	10	12
	Single/other	6	1	0	6	2	0

4.4.5 Data analysis

Thematic analysis, a widely used qualitative analytic method, was used to analyse the focus group data. Braun and Clarke (2006) described thematic analysis as

“a method for identifying, analysing and reporting patterns (themes) within data.” (Braun and Clarke, 2006, p. 79)

and a theme that

“captures something important about the data in relation to the research question, and represents some level of patterned response or meaning within the data set.” (Braun and Clarke, 2006, p. 79)

Thematic analysis usually involves coding data, grouping, and collating the codes into potential themes, identifying final themes and producing an overall

⁷ “Other” included cohabitating and divorced.

thematic structure. Coding depends on whether the themes are more predetermined deductively (theory-driven) or inductively (data-driven) (Braun and Clarke, 2006). In the former, coding can be approached with the key issues, concepts or objectives by which the data can be examined and referenced, but in the latter, coding only depends on the data itself as codes emerge from the data. Following previous research (Campbell-Arvai, 2019; Ward Thompson *et al.*, 2019), a hybrid coding approach combining both deductive and inductive coding was used in this research. First, the topic guide used for the focus groups imposed an initial set of predefined themes on the discussions: 1) important environmental aspects of urban parks, 2) experiences of wild and traditional park sites, 3) environmental interventions for wild park sites, 4) preferences between wild and traditional park sites and 5) understanding of biodiversity. For each theme's analysis, subsequent inductive coding was used, producing codes and subsequent sub-themes that emerged from the data itself, i.e. from what people said.

Specifically, thematic analysis in this research involved four main stages: 1) verbal data were transcribed, followed by familiarisation with the data, 2) the topic guide imposed an initial set of five themes. Based on these themes, the data were labelled into chunks for subsequent retrieval and exploration using the software NVivo 12 Pro, 3) within these themes, which were very broad, subsequent inductive coding was conducted for further exploration to generate sub-themes for telling more detailed stories of the broad predefined themes. For example, under the predefined theme *important environmental aspects of urban parks*, six sub-themes were produced via grouping similar codes that emerged from what people said: *facilities*, *plants and wildlife*, *maintenance*, *woodlands*, *seasonal views* and *other environmental aspects*. 4) The themes and sub-themes were reviewed, clarified, and refined before the production of an overall thematic structure. Notably, coding in this research was a cyclical

process, which involved more than one cycle of recoding to filter, categorise and manage the codes. Cyclical recoding is advocated as a typical approach to thematic analysis and qualitative data analysis (Saldaña, 2009).

4.5 Conjoint analysis

4.5.1 Conjoint analysis research

Conjoint analysis was the second method undertaken in this research, allowing it to build upon some findings from the previous focus groups. Conjoint analysis originated from market research in the 1960s and was developed based on the work of statisticians, including Luce and Tukey (1964) and Green and Rao (1971). Apart from marketing, conjoint analysis has been applied in a number of other research fields to investigate preferences for housing (Aspinall, 2010), outdoor spaces (Aspinall *et al.*, 2010; Nordh, Alalouch and Hartig, 2011; Veitch *et al.*, 2022), street trees (Giergiczny and Kronenberg, 2014), community-members' livelihoods and conservation initiative (Keane *et al.*, 2016), neighbourhood environments (Lima, 2016), and scale effects in landscapes (Stanton, 2016).

Conjoint analysis asserts that people make decisions by making trade-offs between the characteristics that describe the different options of a considered product/object, and

“in a conjoint analysis, a de-compositional approach is taken, in which people’s ratings of an object’s components are deduced from their overall evaluations of the whole object.” (Aspinall, 2010, p. 183)

Conjoint analysis is conducted through the conjoint questionnaire, which involves a number of *choice tasks* by presenting participants with various object *scenarios* and asking participants to choose their preferred one. Each scenario

consists of *attributes* of interest at some level. The *levels* are descriptions of the varying possibilities in the attribute. For example, people may be questioned about three factors that influence their preferences for different houses: location, layout and price. Every factor is considered an *attribute*. For each attribute, there are different possibilities built within it, and each possibility is a *level*. For the three attributes mentioned above, the separate levels may be city centre, near city centre, or suburb for location; detached, semi-detached, or flat for layout; and three different price bands for price. In this way, the different house options can be constructed as combinations of different levels within these chosen attributes. Each combination is considered a *scenario*.⁸ A matrix of house scenarios that equals the number of possible combinations between different levels of attributes can be developed.

From making a series of choices between different house scenarios, participants' preferences for levels of each attribute (utility values), which attribute is more important to participants when buying a house (attribute relative importance) and preferences for certain house scenarios (share of preference) can be ultimately identified. In this sense, conjoint analysis works in a de-compositional way by examining the joint effects of attributes to investigate preferences, including how people value certain attributes and different aspects of attributes as well as preferences for certain scenarios. This is seen as realistic and close to the way people weigh pros and cons and make trade-offs in real life.

Sawtooth Ltd. is the company that developed the software for conjoint analysis research. It has developed five versions of conjoint analysis, including conjoint value analysis (CVA), adaptive conjoint analysis (ACA), choice-based conjoint (CBC), adaptive choice-based conjoint (ACBC) and menu-based conjoint

⁸ In the Sawtooth software for designing the conjoint questionnaire, a scenario is also called a concept or an alternative.

(MBC). This research used adaptive choice-based conjoint (ACBC), the latest conjoint analysis version, which permits the use of more than five attributes with the full-profile method of presenting scenarios. It works in a more engaging and realistic way and can achieve reliable results with a smaller sample size (Orme, 2010; Sawtooth Software Inc., 2014; Lima, 2016; Stanton, 2016; Veitch *et al.*, 2022). However, it should be noted that ACBC can only be completed via the online, web-based approach, as it is customised by adapting the questions to the respondent. This could pose a challenge for older participants in China who may not be skilled in computer use. Assistance for completing the ACBC questionnaire was provided when appropriate to mitigate this challenge.

4.5.2 Conjoint questionnaire design: selection of attributes

Attributes and levels for conjoint analysis are normally predetermined. It is vital to ensure that predetermined attributes cover all the important aspects of the object, including those involved in the research questions and those that participants may consider important and relevant (Lima, 2016; Ward Thompson, 2016). “Biodiversity” (as the research interest) was first set as one park attribute, and it was limited as species richness of flora and fauna in this conjoint study. The other park attributes should cover the key aspects of an urban park that people consider relevant and important. Consistent with previous studies (Aspinall, 2010; Lima, 2016), this study used focus groups to identify other relevant attributes. The focus group participants were asked what aspects of an urban park they considered important and relevant to their park preferences. Data analysis generated nine major park aspects: “facilities,” “plants and wildlife,” “maintenance,” “woodlands,” “seasonal views,” “aesthetic value,” “accessibility and location,” “safety” and “congestion” (Section 5.2). Notably, the aspect of “plants and wildlife” seemed to link with the attribute “biodiversity (species richness)” as initially set. According to the feedback from the first pilot

test of the draft ACBC questionnaire (Section 4.5.4), the inclusion of more than five park attributes made the questionnaire become lengthy and complex, causing a cognitive burden for the respondents in responding to the questionnaire. This study finally took the top five frequently mentioned park aspects, namely “facilities,” “biodiversity (species richness)” (plants and wildlife from the focus groups), “maintenance,” “woodlands” and “seasonal views,” as attributes for the final ACBC questionnaire (Table 4.4). Detailed information on the five attributes and levels is given below.

Table 4.4 Attributes and levels in the conjoint analysis study

Attributes	Levels
Biodiversity (species richness)	1. Species rich flora and fauna 2. Species moderate flora and fauna species 3. Species poor flora and fauna
Facilities	1. Supporting facilities (e.g., resting facilities) & recreation/play facilities 2. Supporting facilities (e.g., resting facilities), no recreation/play facilities 3. Few facilities
Woodlands	1. Wooded areas with dense trees 2. Mix of some trees and open area 3. Sparse trees
Maintenance	1. Well-maintained, neat-looking 2. Moderate-maintained, less neat-looking 3. Low maintenance, wild-looking
Seasonal views	1. Spring flowers 2. Summer green canopy trees 3. Autumn colourful (such as golden or red) foliage 4. Winter branch-trunk viewing plants/conifer trees

Attribute: Biodiversity (species richness)

“Biodiversity” was first set, and it was also a relevant aspect of parks mentioned in the focus groups. Issues like the diversity of plants, wildlife, and ecological environment were mentioned spontaneously, though the term biodiversity was not mentioned directly. Considering the term biodiversity is not frequently used in people’s daily lives, as revealed by the focus groups (Section 5.6), the description of its levels as “high biodiversity level,” “medium biodiversity level”

and “low biodiversity level” may not be applicable. In this conjoint analysis, “biodiversity” was limited to “species richness of flora and fauna,” and this is the aspect of biodiversity that this conjoint analysis expected respondents to envisage when they responded to the questionnaire. Using “species richness of flora and fauna” was inspired by particular quotes from focus group members when they were asked to describe what biodiversity means to them. Moreover, as mentioned in Chapter 3 (Section 3.4.2), species richness has been used by previous studies (Qiu, Lindberg and Nielsen, 2013; Fischer *et al.*, 2018) as a biodiversity indicator to communicate with the public,. According to Fischer *et al.* (2018), species level of biodiversity is critical for biodiversity conservation. Levels of the attribute “biodiversity (species richness)” in this study were described as “species rich flora and fauna,” “species moderate flora and fauna” and “species poor flora and fauna.”

Attribute: Facilities

“Facilities” was prominently mentioned in the focus groups. The presence or absence of recreation/play facilities and supporting facilities (e.g. resting facilities) in parks was frequently mentioned in the focus groups. In the conjoint analysis, the levels of this attribute were presented as “supporting facilities (e.g. resting facilities) & recreation/play facilities,” “supporting facilities (e.g. resting facilities), no recreation/play facilities” and “few facilities.” In China, most urban parks have some facilities, and urban parks with no facilities are not that common, so the study used “few facilities” instead of “no facilities” to make the urban park scenarios in the conjoint questionnaire closer to reality.

Attribute: Woodlands

“Woodlands” arose in the focus groups. Issues like the presence or absence of woodlands and the amount and density of trees were mentioned by the participants. In the conjoint analysis, “woodlands” was described as having

three levels: “wooded areas with dense trees,” “mix of some trees and open areas” and “sparse trees.” Care was taken in terms of language use in order to make the language of the conjoint questionnaire as neutral as possible without biasing the respondents. In Chinese, 森林, 林地 and 树林 are all translations of the term woodlands, but they still have slightly different connotations. 森林 has a more restrictive meaning, implying a vast scale of dense trees and pristine native species, and it is commonly used in the context of nature reserves rather than urban parks. 林地 can be connected with the production of trees for timber or a nursery. 树林 is more generic and neutral and is often used in urban park contexts. 树林 is also commonly used in Chinese laypeople’s language. Thus, 树林 was selected to be used in the conjoint questionnaire.

Attribute: Maintenance

“Maintenance” of urban parks was also a concern for the focus group participants. There were references to vegetation trimming and pruning, and neatness and order, etc. “Maintenance” was set with three levels: “well-maintained, neat-looking,” “moderate-maintained, less neat-looking” and “low maintenance, wild-looking.” A well-maintained, neat-looking urban park can have species poor flora and fauna, yet it is possible that it harbours species rich flora and fauna or species moderate flora and fauna, suggesting the possibility of the non-correlation between the attributes of “maintenance” and “biodiversity.” For this reason, “maintenance” was seen as independent of “biodiversity,” and they were presented as two different attributes.

Attribute: Seasonal views

“Seasonal views” was mentioned in the focus groups, though not as frequently as the prior four park attributes. The focus group participants cared about the characteristics and views of different seasons that could be experienced in

urban parks. In other words, their park preferences were influenced by particular seasonal characteristics and views. The description of the four levels was inspired by quotes from the focus groups: “spring flowers,” “summer green canopy trees,” “autumn colourful (such as golden or red) foliage” and “winter branch-trunk viewing plants/conifer trees.” Notably, “seasonal views” in this study aimed to elicit preferences for different seasons and their particular characteristics commonly appeared in the Chinese urban parks. This attribute did not investigate preferences for seasonal changes or seasonality *per se*, i.e. if people preferred an urban park with different seasonal changes (many changes in different seasons of the year) or an urban park with the same characteristic (e.g. the same evergreen trees all year round) most of the year.

4.5.3 Conjoint questionnaire design: scenario presentation and the Adaptive Choice-Based Conjoint (ACBC) questionnaire

4.5.3.1 *Word or image approach for scenario presentation*

Lima (2016) elaborated on a detailed discussion on the use of words or images in conjoint analysis by referring to the dual coding theory (Paivio, 1986; Sadoski and Paivio, 2012). The dual coding theory postulates that images and words are processed in two separate but correlated imagery and verbal/language brain systems, respectively, and the timing of participants’ mental responses to words or images depends more on the type of information being presented and analysed rather than the medium of presentation (Paivio, 1986; Sadoski and Paivio, 2012). For instance, te Linde (1982) found that information about size was sensitive to the imagery system, and the use of images was better at presenting information related to size, whereas Paivio and te Linde (1980) found that other information, such as brightness or colour, was more relevant

to the verbal system, and no reliable image advantages for presenting such information emerged. Moreover, in another study (te Linde, 1982), when the task being proposed was more complex, the use of images actually slowed down the time of response instead of accelerating it.

The strength of image representation lies in the ease with which respondents can respond to visual representations (Aspinall *et al.*, 2010). However, the use of images can bring a bias effect in conjoint analysis. Aspinall (2010) found that the average importance of attributes presented as images was significantly higher than that of those presented as words. The use of an image can become so attractive that it has a very strong bias effect, which cannot ensure a reliable comparison between attributes. Furthermore, other challenges in using images in conjoint analysis include 1) difficulties in accurately producing each image scenario as a particular combination of attributes, 2) whether attributes in the images are noticed by respondents or not, and 3) the risks of a bias effect that respondents' preferences may be influenced by other features in the images (e.g. lighting, image composition and form), which are not the studied attributes.

It seemed the word approach was more appropriate than the image one in this conjoint analysis for the following reasons: 1) all attributes in this study are not related to aspects such as size that are particularly sensitive to the image-processing brain system, i.e. no attributes could benefit from being presented as images in this study, 2) in conjoint analysis, the use of images can bring bias effects, as Aspinall (2010) found. There are also difficulties and risks in determining whether attributes presented in images would be noticed by respondents or not in their preference decision-making. Words provide clarity on the park attributes to be considered. Moreover, if a study uses images, respondents' preferences may be influenced by irrelevant features in the images, which may cause an impact on their decision-making and lead to

inaccurate results, 3) there are potential difficulties in accurately producing each park image scenario. By contrast, the word approach enables the respondents to envisage parks cognitively based on their real-life park experiences, ensuring their decisions were not overly influenced by other irrelevant features in images. The word approach has been used in a number of conjoint analysis studies in the field of urban/landscape planning and design (Aspinall *et al.*, 2010; Nordh, Alalouch and Hartig, 2011; Lima, 2016; Veitch *et al.*, 2022).

4.5.3.2 Sections of the ACBC questionnaire

The ACBC questionnaire design was completed via Lighthouse Studio 9.8.1 granted by Sawtooth Software (<https://sawtoothsoftware.com/>). Typically, an ACBC questionnaire includes three core sections: *Build Your Own (BYO)*, *Screening* and *Choice Tasks* (Figure 4.21). The *BYO* section asks respondents to indicate their preferred level for each attribute in order to configure their idealised scenario. Usually, attributes with an obvious prior preference order can seem out of place within *BYO*. If an attribute has a prior preference order, such as safety (i.e. people generally prefer a safe environment/situation to an unsafe environment/situation), then it may seem to make no sense to include it in *BYO*.

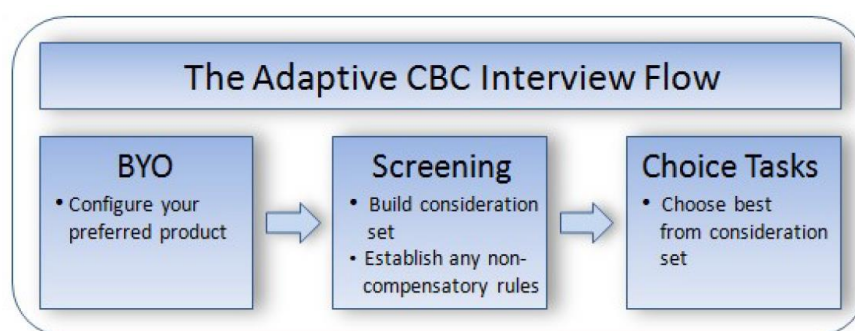


Figure 4.21 Typical sections of ACBC questionnaires (Sawtooth Software Inc., 2014)

In the *Screening* section, respondents are presented with a series of scenarios composed of different levels of attributes, and they are required to indicate

whether each scenario is “a possibility” for them to like or “won’t work for me.” The software program behind the questionnaire selects an array of scenarios for the respondents’ evaluation from a predeveloped matrix of scenarios. This matrix is developed when designing the ACBC questionnaire, and it equals the number of all possible combinations between different levels of the attributes. Determined by the algorithm within the software, the scenario selection is based on the answers to the *BYO* section and also covers the full range of levels. Since the *BYO*-specified ideal scenario differs across respondents, the questionnaire is customised and it is generated on-the-fly for each respondent. During *Screening*, the software program behind the ACBC questionnaire also scans the respondent’s answers to see whether the respondent is using non-compensatory screening rules (i.e. there are absolute cut-off rules that cannot be compensated for by the presence of enough other good characteristics), meaning that there are particular levels of attributes that are constantly avoided as negative and cannot be compensated for by the presence of other positive levels. For example, during *Screening*, if the attribute “biodiversity” in a park scenario is presented as the level of “species poor flora and fauna,” and a respondent keeps selecting “won’t work for me” for this scenario, the software is able to detect and will ask in the *Unacceptables* question whether the level “species poor flora and fauna” is totally unacceptable. Similarly, the software can detect if particular levels are absolute important requirements by scanning the answers in *Screening*, and the software will then ask the respondent whether the identified levels are *Must-Haves*.

Once the respondent completes *BYO* and *Screening*, the questionnaire finally shows *Choice Tasks*. In this section, respondents are presented with a series of scenarios, and they are asked to choose their preferred one. After *BYO* and *Screening*, the scenarios in *Choice Tasks* will best meet the respondent’s needs. This reflects the customised, more engaging quality of ACBC. Moreover, when

the scenarios presented in *Choice Tasks* meet respondents' needs, the software can test more nuanced trade-offs in their choices.

The Sawtooth software has several general recommendations regarding important parameter settings of ACBC questionnaire design in order to ensure the robustness of the results. The ACBC questionnaire was constructed using these general recommendations, but it was also tailored to this specific research as well as feedback from three pilot studies. For further details about these recommendations and the design of important parameter settings, please see Appendix B-3.

4.5.4 Conjoint questionnaire design: three pilot studies and the final ACBC questionnaire

4.5.4.1 *Three pilot studies*

The initial draft questionnaire in Chinese was piloted three times in September and October 2020 (pilot-1: N = 27, including two Chinese conjoint researchers, three landscape professionals and 22 general public; pilot-2: N = 22 in Shanghai; pilot-3: N = 18 in Hangzhou). At the end of the initial questionnaire, text boxes were provided for the respondents to give their comments regarding 1) the general impression of the questionnaire, 2) the clarity of the words and phrases used, 3) the impression of the introduction of attributes and levels at the beginning of the questionnaire (this was added after pilot-1), 4) the length of the questionnaire, 5) whether they need other information to complete the questionnaire and 6) other comments. The pilot results were not used in data analysis.

Based on feedback from the pilot studies, several main changes were made.

(1) The initial questionnaire included six attributes: "biodiversity," "facilities,"

“woodlands,” “maintenance,” “seasonal views” and “aesthetic value.” However, according to the feedback from pilot-1, the inclusion of more than five attributes would generate a cognitive burden for the respondents. The attribute “aesthetic value” was excluded, since it was not that relevant for the focus group participants compared with the other five attributes.

- (2) Since six attributes were reduced to five attributes, a series of parameter settings in ACBC Exercise Settings was changed according to Sawtooth’s recommendations based on five attributes.
- (3) In pilot-1, there were three park scenarios per *Choice Task*. However, it was easier for the participants to choose their preferred one by showing two scenarios per *Choice Task*. Thus, three scenarios were reduced to two scenarios.
- (4) The word approach of presenting attributes was tested. In pilot-1, a few participants indicated the need for images. Some felt there were too many attributes, and they did not want to see many words. Although there was an inclination for images, they indicated that they could envisage the parks with written words and were able to complete questionnaires with words. Indeed, in pilot-1 with 27 respondents, 22 considered the word approach as feasible. After communicating with several conjoint analysis experts, including experts with experience in conducting conjoint analysis in Chinese cities, e.g. Qixiao He (He and Tan, 2019), the study added a detailed description of what was meant by each attribute and level at the beginning of the questionnaire to make it user-friendlier. Moreover, the study also excluded one attribute (aesthetic value). With these refinements, the participants seldom indicated the need for images during the second and third pilot studies and formal data collection, and it seemed that using the word approach was feasible in this study.
- (5) A question about descriptions of Jiangyangfan Eco-Park (wild park case discussed in focus groups in Hangzhou) and Prince Bay Park (traditional

park case discussed in focus groups in Hangzhou) for Hangzhou participants and of Houtan Wetland Park (wild park case discussed in focus groups in Shanghai) and Qiantan Recreation Park (traditional park case discussed in focus groups in Shanghai) for Shanghai participants based on the five attributes was added. This helped to understand the differences between people's preferred park scenarios and wild parks/traditional parks.

4.5.4.2 Final ACBC questionnaire

The final ACBC questionnaires included seven parts, as shown below (for detailed information about the questionnaire, see Appendix B-4).

- (1) Start text: including a brief introduction of the project and issues about ethics and confidentiality. The specific aims of this project were not provided to make sure that the questionnaire would not bias the participants.
- (2) Descriptions of attributes and levels: this page included the description and meaning of each attribute and level used in this questionnaire.
- (3) BYO: the participants were asked to select their preferred level for each attribute and to "build" their ideal urban park scenarios.
- (4) Screening: each page presented four park scenarios, and the participants were asked to evaluate each one by indicating whether there was a possibility to like it (i.e. "a possibility" versus "won't work for me"). During Screening, the software scanned the participants' answers to see if there were levels that were constantly avoided (Unacceptables) or levels that were constantly preferred (Must-Haves).
- (5) Choice Tasks: each page included two park scenarios, and the participants were asked to choose the preferred one.
- (6) Sociocultural information: including age, gender, residential district in Hangzhou/Shanghai, education, marital status, childhood living environment, professional background and their knowledge/interest in nature/parks/ecology.

(7) Park visit experience: descriptions of Jiangyangfan Eco-Park and Prince Bay Park (for Hangzhou participants) and of Houtan Wetland Park and Qiantan Recreation Park (for Shanghai participants) based on the five attributes.

4.5.5 Formal survey and samples

The formal conjoint survey in Hangzhou was conducted in November 2020 and in January and April 2021. In Shanghai, the formal survey was conducted in December 2020 and April 2021. Questionnaires were distributed among dwellers within the selected survey districts in Hangzhou and Shanghai. The survey covered all research districts to avoid oversampling within one district. Due to the impact of COVID-19 at the time, the field surveys and online surveys were combined. For the field surveys, participants above 18 years old were randomly recruited in various public spaces in the selected survey districts. Since the ACBC survey is web-based, all field survey questionnaires were undertaken on my computer.

Online surveys were carried out with neighbourhood residents and ecology/landscape professionals. The ACBC questionnaires were uploaded to the Sawtooth software hosting server, and a questionnaire link was generated. With the assistance of several community committees,⁹ more residents entered the web survey with the questionnaire link. To recruit ecology/landscape professionals in Hangzhou, members and staff from Zhejiang University, Zhejiang Wilderness Nature Education Organisation, Zhejiang Museum of Natural History and Hangzhou Municipal Bureau of Garden and Cultural Relics were contacted through emails and WeChat.

⁹ In Hangzhou, the communities that agreed to participate in the survey were the Yuhuangshan, Pujia, Shengyuan and Yijia communities. In Shanghai, the communities that participated were the Tianshan Xingcheng, Jinqiao and Xiangnan communities.

Likewise, in Shanghai, members and staff from Tongji University, East China Normal University, Shanghai Jiao Tong University and Forest City Studio were contacted through emails and WeChat. As the response rate was relatively low, other ecology/landscape professionals were recruited through personal contacts.

This study recruited a total of 381 respondents of which 280 were the public and 101 were ecology/landscape professionals. The survey aimed to collect a diverse sample proportionate to the census data of the selected survey districts. Table 4.5 shows the comparison between the samples and relevant statistics from the 2019 census in each city. A chi-square test revealed that the gender ratio in each city sample was not significantly different from that of the census data (Hangzhou: $\chi^2 = 0.000$, $p = 1.000$; Shanghai: $\chi^2 = 0.723$, $p = 0.395$). The ages in the Hangzhou sample were not significantly different from that of the Hangzhou census data ($\chi^2 = 4.218$, $p = 0.121$). However, the ages in the Shanghai sample were significantly different compared with the census ($\chi^2 = 8.970$, $p = 0.011$). This was because the Shanghai survey registered more younger adults (38.7% versus 19.6% of the census) but involved fewer middle-aged adults (26.8% versus 40.3% of the census) (Table 4.5), as the latter age group was difficult to recruit during the survey. The Hangzhou respondents' residential districts covered all eight research districts. A chi-square test showed that the number of respondents in residential districts was significantly different from that of the census ($\chi^2 = 16.460$, $p = 0.021$): there was an overrepresentation of respondents who lived in Xi Hu district (33.2% versus 14.2% of the census) and an underrepresentation of those who lived in Xiao Shan district (9.6% versus 26.2% of the census). In Shanghai, the respondents' residential districts covered all 10 districts, and the chi-square test indicated no significant differences for the residential districts between the Shanghai sample and the census ($\chi^2 = 10.831$, $p = 0.287$).

Table 4.5 Comparison between the samples and relevant statistics from the 2019 census in each city (S = sample, C = census and D = difference)

		Hangzhou sample (N=187)				Shanghai sample (N=194)			
Variable		S (N)	S (%)	C (%)	D (%) ¹⁰	S (N)	S (%)	C (%)	D (%)
Gender	Male	92	49.2	49.4	-0.2	85	43.8	49.5	-5.7
	Female	95	50.8	50.6	0.2	109	56.2	50.5	5.7
Age	18-34	77	41.2	27.4	13.8	75	38.7	19.6	19.1
	35-59	71	38.0	45.5	-7.5	52	26.8	40.3	-13.5
	60+	39	20.9	27.1	-6.2	67	34.5	40.1	-5.6
Residentia l districts in Hangzhou	Shang	15	8.0	6.7	1.3	-	-	-	-
	Cheng								
	Xia Cheng	11	5.9	8.5	-2.6	-	-	-	-
	Jiang Gan	20	10.7	11.3	-0.6	-	-	-	-
	Gong Shu	21	11.2	7.5	3.7	-	-	-	-
	Xi Hu	62	33.2	14.2	19.0	-	-	-	-
	Bin Jiang	8	4.3	4.8	-0.5	-	-	-	-
	Xiao Shan	18	9.6	26.2	-16.6	-	-	-	-
	Yu Hang	32	17.1	20.8	-3.7	-	-	-	-
Residentia l districts in Shanghai	Huang Pu	-	-	-	-	9	4.6	8.3	-3.7
	Xu Hui	-	-	-	-	23	11.9	8.8	3.1
	Chang Ning	-	-	-	-	10	5.2	5.7	-0.5
	Jing An	-	-	-	-	9	4.6	9.1	-4.5
	Pu Tuo	-	-	-	-	14	7.2	8.8	-1.6
	Hong Kou	-	-	-	-	6	3.1	7.3	-4.2
	Yang Pu	-	-	-	-	9	4.6	10.6	-6.0
	Min Hang	-	-	-	-	41	21.1	10.9	10.2
	(subdistrict)								
	Bao Shan	-	-	-	-	13	6.7	8.0	-1.3
	(subdistrict)								
	Pu Dong	-	-	-	-	60	30.9	22.6	8.3
	(subdistrict)								

¹⁰ Difference was calculated by subtracting census percent from sample percent.

Table 4.6 Profile of the whole sample (N = 381), the Hangzhou sample (N = 187) and the Shanghai sample (N = 194)

	Whole sample (N = 381)				Hangzhou sample (N = 187)				Shanghai sample (N = 194)			
	Public (N = 280) ¹¹		Professional (N = 101)		Public (N = 147)		Professional (N = 40)		Public (N = 133)		Professional (N = 61)	
	N	%	N	%	N	%	N	%	N	%	N	%
Gender												
Male	124	44.3	53	52.5	70	47.6	22	55.0	54	40.6	31	50.8
Female	156	55.7	48	47.5	77	52.4	18	45.0	79	59.4	30	49.2
Age												
Younger adults (18-34)	89	31.8	63	62.4	53	36.1	24	60.0	36	27.1	39	63.9
Middle-aged adults (35-59)	97	34.6	26	25.7	60	40.8	11	27.5	37	27.8	15	24.6
Older (60+)	94	33.6	12	11.9	34	23.1	5	12.5	60	45.1	7	11.5
Education												
High school or below	74	26.4	2	2.0	31	21.1	2	5.0	43	32.3	0	0.0
Junior college	60	21.4	6	5.9	32	21.8	3	7.5	28	21.1	3	4.9
Undergraduate degree	102	36.4	38	37.6	64	43.5	9	22.5	38	28.6	29	47.5
Postgraduate degree or higher	44	15.7	55	54.5	20	13.6	26	65.0	24	18.0	29	47.5
Marital status												
Married	207	73.9	51	50.5	100	68.0	18	45.0	107	80.5	33	54.1
Single and other	73	26.1	50	49.5	47	32.0	22	55.0	26	19.5	28	45.9
Childhood living environment												
Rural	67	23.9	25	24.8	43	29.3	10	25.0	24	18.0	15	24.6
Urban	213	76.1	76	75.2	104	70.7	30	75.0	109	82.0	46	75.4
Residential context												
City core	152	54.3	57	56.4	101	68.7	28	70.0	51	38.3	29	47.5
Urban periphery	128	45.7	44	43.6	46	31.3	12	30.0	82	61.7	32	52.5
Have knowledge/interest in nature/parks/ecology?												
Yes	34	12.1	101	100.0	24	16.3	40	100.0	10	7.5	61	100.0
No	246	87.9	0	0.0	123	83.7	0	0.0	123	92.5	0	0.0

¹¹ Public group and professional group in the whole sample are referred to as “whole public sample” and “whole professional sample” respectively in the thesis. Similarly, public group and professional group in the Hangzhou sample are referred to as “Hangzhou public sample” and “Hangzhou professional sample,” which are also applicable to Shanghai case study.

Table 4.6 presents the respondent characteristics of the three datasets, i.e. the whole sample (N = 381), Hangzhou sample (N = 187) and Shanghai sample (N = 194). Each dataset involved two groups, namely the public group and the ecology/landscape professional group. In the whole public sample, the total number of female respondents (55.7%) was slightly higher than the number of males (44.3%). As for age, the whole public sample was evenly distributed between three age groups.¹² Undergraduate degree was the most represented education group in the whole public sample. The majority of the respondents in the whole public sample were married (73.9%) and grew up in urban areas (76.1%), and 54.3% of this sample lived in the city core. The majority (87.9%) had no knowledge of or interest in nature/parks/ecology.

In the Hangzhou public sample, the participants were almost equally distributed by gender, and 36.1%, 40.8% and 23.1%, respectively, fell within the younger adult, middle-aged adult and older groups. Undergraduate degree was also the most represented education group (43.5%). The majority of the Hangzhou public participants were married (68.0%), grew up in urban areas (70.7%), lived in the city core (68.7%) and had no knowledge of or interest in nature/parks/ecology (83.7%). Regarding the Shanghai public sample, it presented a higher number of female respondents (59.4%) than males (40.6%) and involved more older respondents (45.1%) than the other two age groups. Furthermore, 32.3% of the Shanghai public sample had high school or below education, and 28.6% had the educational attainment of undergraduate degree. Similar to the Hangzhou public sample, the majority of the Shanghai public participants were married (80.5%), grew up in urban areas (82.0%) and had no knowledge of or interest in nature/parks/ecology (92.5%), while 61.7% lived in the urban periphery.

¹² The cut-off age chosen was in accordance with the census data of Hangzhou (HMSB, 2019) and Shanghai (SMSB, 2019).

The study acknowledges the relatively small proportion of professionals (N=101 in the whole sample, N=40 in the Hangzhou sample, and N=61 in the Shanghai sample). This was due to the low response rate of surveying professionals. However, for an ACBC study, smaller samples do not necessarily mean a higher than accepted standard error in the data because one advantage of ACBC is that it can achieve reliable results with small sample sizes. On the question of the exact estimation of appropriate small sample sizes for ACBC, previous conjoint analysis research (Jervis, Ennis and Drake, 2012; Lima, 2016; Lima *et al.*, 2020) estimated that an ACBC study can achieve reliable results with one-third of the sample size required for a choice-based conjoint (CBC) study (with the same questionnaire settings as the ACBC study), another conjoint analysis version. The sample size required for a CBC study is usually estimated using the formula $nta/c > 500$, where n = number of respondents, t = number of choice tasks ($t = 13$ in this study), a = scenarios per choice task ($a = 2$ in this study) and c = largest number of levels of an attribute ($c = 4$ in this study). It was deduced that n should be larger than 77, and the threshold of one-third of n was 26. In the three sample datasets, both the public and professional group sample sizes surpassed the threshold of 26 participants.

4.5.6 Data analysis

The ACBC data were analysed with a Hierarchical Bayes (HB) model, Choice Simulator and counting analysis using Sawtooth Software Lighthouse Studio version 9.8.1. The HB model generated two sets of data: the utility value for each level and the average importance of attributes. Choice Simulator produced the data on the share of preference. These types of data are described below.

Utility value

A utility value indicates the preference for a particular level relative to the other levels within one attribute. Utility values are interval data, and within each attribute, utility values for different levels are scaled to sum to zero. Utility values can be compared only within the same attribute and cannot be compared across attributes (Orme, 2010). One thing to note is that the negative utility value of a level does not necessarily indicate that the given level is unattractive; rather, this level may be acceptable to all participants. However, with all else being equal, a level with a positive utility value is preferred over a level with a negative utility value (Orme, 2010). An HB model can be used to estimate the utility values of different levels.

Average importance of attributes

By calculating the range of utility values of the different levels within one attribute, the relative importance of this attribute can be estimated. The relative importance of an attribute represents the relative effect, or importance of this attribute compared with other attributes, on people's choices/preferences for different object scenarios. The average importance of attributes adds up to 100, and they are relative data. The high importance of one attribute indicates a large utility value difference between the levels of the most preferred and least preferred (Orme, 2010).

Share of preference for different scenarios

Conjoint analysis also generates the share of preference for different scenarios. Share of preference is converted from utility values, and it permits ratio operations. It is used to predict preference shares for several compared scenarios, and the result *share of preference* (%) for a scenario indicates how many respondents (%) vote for (i.e. preferred) that scenario. The sum of shares of preference for all the compared scenarios equals 100%.

Using Choice Simulator in Lighthouse Studio, share of preference was used to predict preferences between wild and traditional parks. Using different attribute levels that characterise the two park styles, typical wild and traditional park scenarios were created.

This research used different attribute levels to characterise and create typical Chinese wild and traditional park scenarios in Lighthouse Studio. The main characteristics for describing wild and traditional park scenarios were based on a summary of previous research (e.g. Zhang and Zhang, 2002; Deng, 2003; Li *et al.*, 2019b; Wang *et al.*, 2021) and were also presented in Chapter 2 (Sections 2.4.2 and 2.4.5). The main characteristics of wild parks include species diversity, fewer recreation/entertainment amenities, vegetation with more complex structures and compositions (e.g. multi-layered dense vegetation) and a low-intensive, near-natural maintenance manner, while the main characteristics of traditional parks include limited species diversity, diverse amenities, vegetation with relatively simple structures and compositions (e.g. open areas with single-tiered trees) and a high maintenance intensity. Correspondingly, for data analysis, the typical wild park scenario was created using the levels “species rich flora and fauna,” “supporting facilities, no recreation/play facilities,” “wooded areas with dense trees,” “low-maintenance, wild-looking” and the four levels of the attribute “seasonal views.” The typical traditional park scenario was created using “species poor flora and fauna,” “supporting facilities & recreation/play facilities,” “mix of some trees and open areas,” “well-maintained, neat-looking” and the four levels of the attribute “seasonal views.” Such wild and traditional park scenarios are representative and typical in China. For testing preferences between wild and traditional park styles, this conjoint analysis research mainly tested these two scenarios.

To explore what changes (i.e. environmental interventions) in the wild park

scenario could enhance the respondents' preferences, sensitivity analysis (Aspinall, 2010) was then conducted. Sensitivity analysis offers implications for the practical planning, design and management of existing wild parks with the purpose of bringing about the greatest positive change. The information documented in the profile of the wild park scenario was used as a reference point to investigate the potential by which any attribute (except for the attribute "seasonal views") that increased or decreased in level that could influence the share of preference. Each attribute level (except for "seasonal views") that described the wild park scenario (baseline level) was changed while holding the other attributes' levels specified in the wild park scenario constant. For example, "low-maintenance, wild-looking," which was used to describe the wild park scenario, was changed to "well-maintained, neat-looking" (holding the other attributes' levels specified in wild park scenarios constant) to see the share of preference change.

Counts

Counts are ratio data and indicate a proportion of selection for each level, i.e. the number of times a scenario containing that level is chosen relative to the number of times a scenario containing that level is available to choose. For ACBC, counts are generated from different sections in ACBC data (*BYO*, *Screening*, *Must-Haves* and *Unacceptables*, *Winning Concepts*). The outputs of the counting analysis include how often levels are selected in *BYO*, how often levels are *Must-Haves*, how often levels are *Unacceptables* and the composition of the *Winning Concept* from *Choice Tasks*.

The relevant data were analysed using SPSS Statistics version 25 for statistical differences, correlations and regressions. Before conducting the statistical tests, all data were checked with normality distribution. When checking the statistical differences between two groups of the sample, the parametric independent

samples-t test was used when both variables showed normal distributions, and the non-parametric Mann–Whitney U test was used when one or two of the variables did not show normal distributions (Field, 2009). To check the statistical differences between three or more than three groups, parametric ANOVA was used when all variables were normally distributed, and non-parametric Kruskal–Wallis was used when one of the variables did not show a normal distribution (Field, 2009). To test for statistically significant differences between variables within groups of the sample, the parametric paired samples-t test was carried out if the difference between the variables to be tested was normal, and the non-parametric Wilcoxon test was used when the difference between the variables to be tested was non-normal (Field, 2009). Correlations between certain attribute importance/utility values were analysed. The correlations were conducted using the non-parametric Spearman test when one or two of the variables did not show normal distributions, and the parametric Pearson test was used when both variables were normally distributed. Regressions were conducted to analyse how different sociocultural variables of the sample influenced the importance attached to the attribute “biodiversity.” Statistical significance was set at 0.05. A 95% confidence interval (CI) was applied and illustrated by SPSS.

4.6 Semi-structured interviews

Semi-structured interviews were used in Phase III. Bryman (2008) suggested that one should use semi-structured interviews if the investigation has a fairly clear focus. He indicated that

“if the researcher is beginning the investigation with a fairly clear focus, rather than a very general notion of wanting to do research on a topic, it is likely that the interviews will be semi-structured ones, so that the more specific issues can be addressed.” (Bryman, 2008, p. 439)

Interviews were planned in the final phase with some findings from the previous

methods in mind; thus, the investigation in Phase III had a relatively clear focus. In comparison with structured interviews where the conductor asks the same predetermined questions to all interviewees in the same order and in a rigorous way, semi-structured interviews are open, and the questions are loosely structured, allowing interviewees to express their ideas with some freedom.

4.6.1 Semi-structured interview design and sampling

The interview questions were open-ended and loosely structured around a set of predetermined questions. Notable findings emerging from the conjoint questionnaire informed the topics discussed in the interviews. The interviews were conducted with a subset of the conjoint questionnaire respondents who volunteered for the interview. However, the interview sample may have been unrepresentative due to a lack of age diversity: there were few older questionnaire respondents who were willing to participate in the interview.

The topic guide for the public interviews included two sections: 1) public responses to biodiversity in urban parks and 2) public preferences between wild and traditional park styles and desired changes for the wild park style. The topic guide for the professional interviews included three sections: 1) comments on some findings from the conjoint analysis (mainly the sociocultural groups' preference differences), 2) perceptions of biodiversity and different park styles and 3) potential approaches for promoting both urban biodiversity and public appreciation in China. For detailed information about the topic guides, please see Appendix B-5.

Unlike the focus groups using actual sites and conjoint analysis using share of preference scenario modelling, the semi-structured interviews used manipulated photographs (a fixed viewpoint/direction was selected) (see

Section 7.3) to elicit the interviewees' perceptions and preferences for wild and traditional park styles. Three different approaches (photographs, scenario modelling and actual sites) helped to understand the question of preferences between two park styles from different perspectives.

4.6.2 Conducting semi-structured interviews and data analysis

The interviews were conducted in July and August 2021. A few interviews with professionals were conducted in October and November of 2021. Some conjoint questionnaire participants who initially volunteered for the interview were unavailable. Moreover, I could not reach some of the volunteers based on the contact information they left. Finally, 22 interviews were conducted in Hangzhou and 25 in Shanghai. All interviews were planned face-to-face at appointed dates and locations (at the interviewees' convenience), yet some failed to show up in person, and the interviews were changed online via WeChat. Each interview lasted about 50 minutes on average and was sound-recorded with the interviewees' permission. The pilot was undertaken in July 2021 before the main interviews.

Table 4.7 provides a summary of the socio-demographic information of the total interview sample and each city sample. Gender balance in the Hangzhou interview sample was achieved (50.0% male and 50.0% female). Yet the gender ratio was uneven in the Shanghai interview sample, with more females than males (40.0% male and 60.0% female), contributing to the unbalanced gender situation in the total sample (44.7% male and 55.3% female). The interviewees in the total sample were drawn mainly from younger adults (aged 18–34) and middle-aged adults (aged 35–59): 48.9% were 18–34 and 44.7% were 35–59. More than half of the Hangzhou interviewees were middle-aged adults (63.6%), and in Shanghai, more than half were younger adults (64.0%). Regarding

educational qualifications, there was a distinct lack of interviewees whose educational level was high school or below (4.3% of the total sample, 4.5% of the Hangzhou sample and 4.0% of the Shanghai sample). Undergraduate degree and postgraduate degree or higher were the most represented education groups (Table 4.7). The majority of the interviewees were the general public (total sample: 78.7%, Hangzhou sample: 77.3%, Shanghai sample: 80.0%). Of the total 47 interviewees, 10 were ecology/landscape professionals, with five from each city (for details of the professionals, see Appendix B-6).

Table 4.7 Profile of the total interview sample, Hangzhou interview sample and Shanghai interview sample (note: HS = high school or below, JC = junior college, UG = undergraduate degree and PG = postgraduate degree or higher).

		Total (N = 47)		Hangzhou (N = 22)		Shanghai (N = 25)	
		N	%	N	%	N	%
Gender	Male	21	44.7	11	50.0	10	40.0
	Female	26	55.3	11	50.0	15	60.0
Age	18-34	23	48.9	7	31.8	16	64.0
	35-59	21	44.7	14	63.6	7	28.0
	60+	3	6.4	1	4.5	2	8.0
Education	HS	2	4.3	1	4.5	1	4.0
	JC	5	10.6	3	13.6	2	8.0
	UG	23	48.9	12	54.5	11	44.0
	PG	17	36.2	6	27.3	11	44.0
Professional or not	The public	37	78.7	17	77.3	20	80.0
	Professionals	10	21.3	5	22.7	5	20.0

The interview data were analysed with NVivo with the following steps: 1) transcribe the interview verbal data as texts for reading, 2) break down the data based on the questions asked in the topic guides to generate the initial broad framework, 3) within the broad framework, read and code the data, 4) group and organise similar codes and generate categories within the broad framework, 5) flag emergent points/patterns, and code them for particulars. Steps 3–5 were done repeatedly; therefore, the interview data analysis was a cyclical process.

4.7 Summary

This chapter describes the research outline of the empirical investigation. The first section elucidates the main research aim and questions (Section 4.2). The second section (4.3) explains why this research selected Hangzhou and Shanghai as the study areas and the two cities' background information. It also presents this research as a mixed-method study and describes the research methodology consisting of three methods/phases related to each other: the relevant results from the Phase I focus groups identified the key issues, which were then used for designing the Phase II conjoint analysis questionnaire, and Phase III semi-structured interviews with volunteer questionnaire participants were conducted to explore notable findings from the Phase II conjoint analysis (also to obtain more in-depth views and identify issues not previously addressed). The research methodology was implemented in two cities, using the same sequence and structure in each one. The findings from all research methods were interpreted via triangulation. Through triangulation, the use of the three different methods aimed to answer the research questions in a more integrated way. The final three sections (4.4, 4.5 and 4.6) detail each research method and how they were used in this study.

Chapter 5: Results of focus groups

5.1 Introduction

This chapter presents the results of focus groups in Hangzhou and Shanghai. This was the first phase of data collection in this research. The use of focus groups aimed to qualitatively understand the following questions:

- 1) What are the important aspects/attributes of urban parks that influence residents' park preferences (related to research objective 1)?
- 2) How do residents respond to wild and traditional park styles (related to research objective 2)?
- 3) What are the changes to wild park sites that residents would like to see (environmental interventions; related to research objective 2)?
- 4) Between wild and traditional park styles, which is preferred and why (related to research objective 2)?
- 5) How do residents perceive and understand biodiversity (residents' mental constructs of biodiversity; related to research objective 1)?

The topic guide used for the focus groups was developed according to the five aims, and it imposed a set of themes: 1) important environmental aspects of urban parks, 2) experiences of wild and traditional park sites, 3) environmental interventions for the wild park sites, 4) preferences between wild and traditional park sites and 5) understanding of biodiversity. For each theme, subsequent coding identified a series of codes, and similar codes were grouped into sub-themes (see Section 4.4.5 for more information on focus group data analysis). The final overall thematic structure is presented in Figure 5.1.

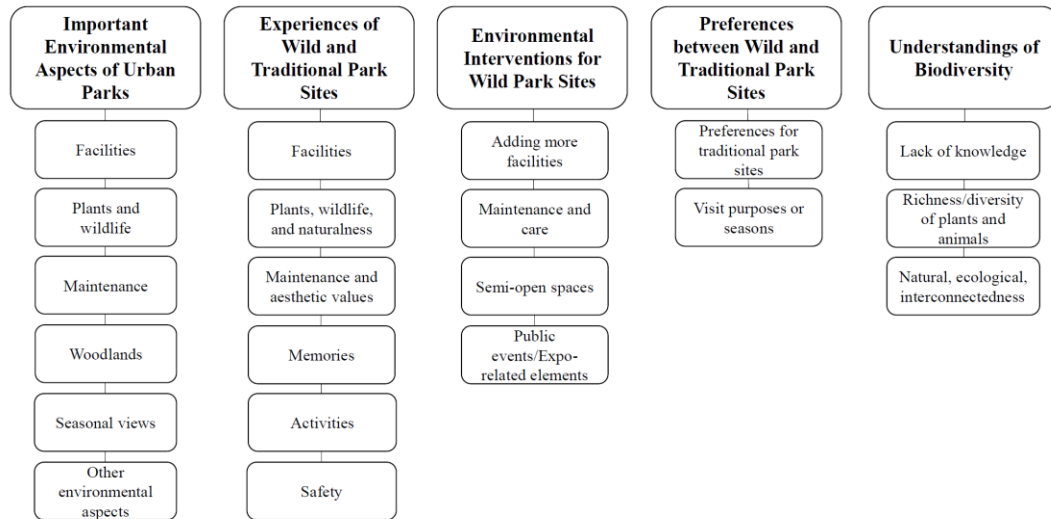


Figure 5.1 Overall thematic structure resulting from focus group data, from themes to sub-themes

The results of the focus groups are presented according to this overall thematic structure in a way that allows a comparison of the themes and sub-themes between the two cities. The results are presented with relevant quotes. When quoted, the participants are indicated with a letter indicating their gender and a number indicating their age (e.g. W58 = woman, 58 years old and M29 = man, 29 years old. M29-2 = second 29-year-old man).

5.2 Important environmental aspects of urban parks

Participants were first asked about their favourite urban parks in their city. This was a warm-up question, and the answers to this question helped the researcher to generally understand participants' preferred park styles. Hangzhou and Shanghai respondents' favourite urban parks are shown in Figure 5.2. Generally, Hangzhou's popular urban parks are located around West Lake Scenic Area and the city core districts of Shang Cheng and Xi Hu. Both Jiangyangfan Eco-Park (selected wild park) and Prince Bay Park (selected

Participants were then asked about the environmental aspects of parks that they considered important and that influenced their experiences with parks, either pleasant or unpleasant. Data analysis revealed nine main environmental aspects. Overall, when considering the total number of times each aspect was mentioned, the ranking order of the nine aspects, from the most to the least mentioned, was 1) facilities, 2) plants and wildlife, 3) maintenance, 4) woodlands, 5) seasonal views, 6) aesthetic value, 7) accessibility and location, 8) level of congestion and 9) safety (Figure 5.3). A more detailed presentation of the nine aspects is provided below.

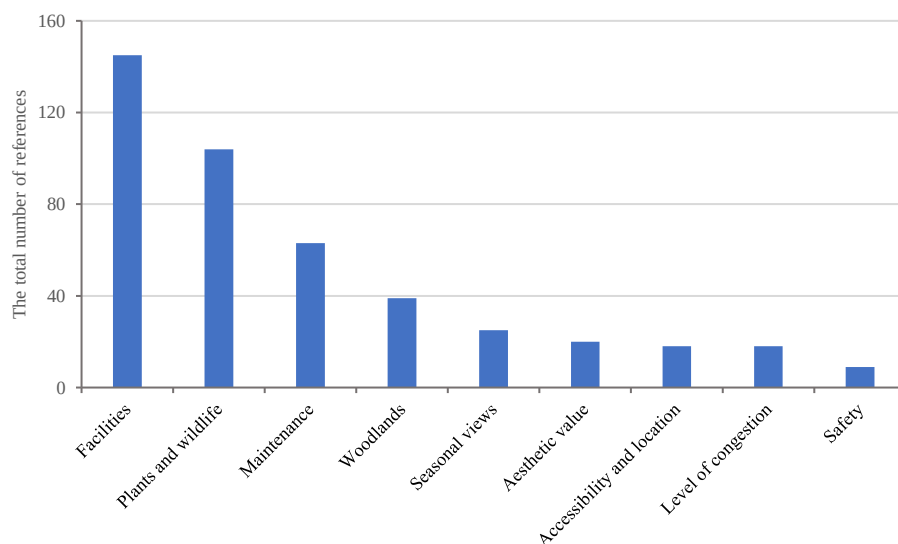


Figure 5.3 Nine environmental aspects of urban parks that participants considered important, according to the total number of times each aspect was mentioned

5.2.1 Facilities

Presence or absence of facilities was a frequently mentioned important park aspect, especially in Shanghai. The aspect of facilities encompassed three sub-aspects: 1) supporting facilities, such as benches, pavilions, toilets and bins, 2) recreation and entertainment facilities and venues and 3) play facilities for children.

In both cities and across different age groups, parks with more *supporting facilities* were generally preferred over those with fewer supporting facilities. Such supporting facilities included lighting, convenient car parking, signage, toilets, benches, bins, pavilions, good footpaths and convenience stores serving food and water.

“Nowadays, parks are not like the ones in the past. Parks are really large now. I hope parks can have more resting facilities with shelters for our old people, like pavilions. We can sit and talk there.” (M70-2, older group-2¹³, Shanghai)

Interestingly, one middle-aged female participant from Hangzhou deemed facilities not that important for a park. She did not like parks with many facilities, since she felt that they were artificial and man-made.

“I once went to Norway. When I went to climb mountains there, I saw wild mountains and scenery all the way. If this was in our country, facilities like cable cars or many trails would be constructed immediately to attract tourists. But they [other countries] don’t do that. For example, a high boulder ... It even does not have guardrails or warning signs. An individual should learn to be careful about his or her own safety since childhood ... I think signs and those facilities are not necessary ... Some parks introduce electronic or cartoon signs, like Changzhou Dinosaur Park or whatever. I think these are not necessary. I think we should respect nature.” (W58, middle-aged adult group, Hangzhou)

In both cities, there were references to the contributions of *recreation and entertainment facilities and venues*, for example, barbecue/picnic areas and fitness equipment, and several interesting characteristics, such as bridges, fountains and sculptures, to parks. Shanghai’s participants mentioned this sub-aspect more frequently than Hangzhou’s participants. For example, one younger adult from Shanghai talked about Jing’an Sculpture Park in Shanghai, which has different interesting sculptures, stating,

“I like Jing’an Sculpture Park because of some interesting characteristics in this park, you know, sculptures and art.” (M29-3, younger adult group-2,

¹³ This means the second older group in Shanghai.

Shanghai).

Among the younger and middle-aged adults, there were references to the importance of *play facilities for children* in urban parks, as their children considered them attractive. Notably, one Shanghai participant talked about her appreciation of play facilities in Qiantan Recreation Park.

“For people like us, with children, we prefer parks with something children can play with. Qiantan Recreation Park has sandpits and slides. My son really enjoys them.” (W38, middle-aged adult group, Shanghai).

5.2.2 Plants and wildlife

The aspect of plants and wildlife included four sub-aspects: 1) plants, 2) naturalness, 3) ecological environment and 4) wildlife and nature education. It seemed the references to this aspect touched on the concept of biodiversity, although this word was not used directly by participants.

Both Hangzhou's and Shanghai's participants believed *plants* were a very important park element, and their existence was highly preferred. Some participants also mentioned the importance of diversity of plant species. They cared about seeing a great variety of plant species and noted that a park with more diverse plant species was preferred over a simply green park.

“Different plants are important. I like parks with a great variety of plant species. I don't like parks with many modern or artificial elements. But natural elements like diverse plant species, streams and water are important.” (W26, younger adult group, Hangzhou)

In both Hangzhou and Shanghai, trees and woodlands and their character and density became a special focus when discussing plants. Participants talked about how the character and density of trees and woodlands had an influence on their appreciation of parks. This point is separated as a distinct aspect, that is, woodlands, outlined in Section 5.2.4.

When talking about plants, words related to *nature*, such as “natural,” “nature-like” and “natural environment,” were used frequently. Interestingly, in Shanghai, these nature-related words were often used in relation to green plants and vegetation as opposed to built structures. In Hangzhou, nature-related words were more often used in the context of human influence or intervention. Participants mentioned that features of natural origin (without excessive human influence and traces) were important. One female participant talked about her appreciation of native plants.

“Well, features of natural origin such as native plants are very attractive. A natural environment is important. I don’t like parks to have many man-made elements.” (W58, middle-aged adult group, Hangzhou)

“Because in cities ... Cities are not like the countryside, with fresh air and a natural feel. Cities are full of buildings, roads and such. If I want to experience nature and fresh air, I can only go to parks to have this feeling. So, plants are important. In cities, parks with more green plants provide us with a place to experience nature.” (M29-4, younger adult group-2, Shanghai)

There were some references to *ecology-related* points, such as ecological environment and ecological quality, when participants discussed the naturalness of urban parks. An older participant shared his experience of visiting Dharma Drum Mountain in Taiwan. He enjoyed meditating and formal sitting at that location, and he appreciated its good ecological environment, including water, forest and rock.

“The natural ecological environment is very important to me ... I mean, I like formal sitting, meditating and quietness. I enjoy the feeling of being in a forest. I once visited Dharma Drum Mountain in Taiwan. I sat on rocks for three hours. It was very comfortable. I enjoyed the fresh air. The water ... the sound of water made me relax. I think parks should have this kind of good ecological environment for us to be away from noise and experience tranquillity.” (M66-2, older group, Shanghai)

Throughout the discussions, there were references to the importance of *wildlife and nature education* in urban parks, mostly the result of middle-aged adults’

and younger adult participants' input. A middle-aged adult participant from Shanghai happily talked about her fascination with seeing birds in Binjiang Forest Park and in the wetlands on Chongming Island in Shanghai.

"It's good to see wildlife in parks! Wildlife makes a park attractive! Like Binjiang Forest Park and Chongming Island. There are many migratory birds." (W45, middle-aged adult group-2, Shanghai).

In both cities, nature education was particularly mentioned by several middle-aged and younger adult participants who had children in the household. They strongly wished that urban parks would provide more nature education services for children to gain knowledge about plants, butterflies and insects.

W39: I suggest that ... because it is a park ... and it has a variety of plants, but we don't know these plants. Parks could have nature education services ... for example, tutors leading kids around and teaching them about plants, such as plant families. I think Chinese students spend a lot of time doing homework. They need to learn more about nature.

M40: Yes, yes, this is important. Parks could function as a nature classroom.

W39: So, if there is nature education in parks ... kids learn about plants, butterflies and insects. They are very interested in them. (From a conversation with middle-aged adult group-2, Shanghai)

5.2.3 Maintenance

References to maintenance encompassed two sub-aspects: 1) general maintenance and 2) maintenance of plants. Participants mentioned the importance of *general maintenance* for parks, including upkeep and cleanliness.

"In my opinion, maintenance of parks is very important. I mean, to keep it clean and tidy. I don't want to visit a park with a low degree of maintenance. Maintenance is fundamental." (W67, older group-2, Hangzhou)

References to the *maintenance of plants* were mostly due to Shanghai's participants' input. While most of these references conveyed the importance of maintenance of plants and the preference for manicured vegetation, a few indicated that the pruning of plants did not need to be very intense and that wild,

spontaneous vegetation was acceptable.

“Flowers, plants ... They should be manicured. They represent the image of Shanghai.” (W44, middle-aged adult group-2, Shanghai)

“Well, the pruning of plants is important to some extent. Flowers, grasses and weeds can be manicured, but it is also possible to let them grow by themselves. Well, still, it is not good to see a thick growth of weeds, I mean, very tall.” (M66-2, older group, Shanghai)

5.2.4 Woodlands

When participants talked about plants, the character and density of woodlands and trees were frequently mentioned; therefore, it was separated as a distinct aspect. Participants cared about the character and density of woodlands. Some preferred dense and lush woodlands, whereas others preferred moderately dense woodlands or large open spaces. The aspect of woodlands encompassed two sub-aspects: 1) wooded areas with dense trees and 2) other options.

In both cities, there were references to a preference for “*wooded areas with dense trees*” (quote from W34, younger adult group, Shanghai). Notably, most references came from middle-aged and younger adults.

W34: I’ve never been to Pujiang Country Park. I’ve heard that it has few tall shade trees. It is really hot without that shade, so I do not want to go.

W34-2: It is a big park with a lot of zones. It also has castles ...

W34: Yes, yes, something like Dream Garden.

W34-2: Yes, yes.

W34: My friends say it has few trees. Few trees in a big park!

W34-2: It has many zones, but without trees to provide shade.

W34: That’s not advantageous. I prefer wooded areas with dense trees, such as forest parks. (From a conversation with the younger adult group, Shanghai)

Regarding woodland character and density, there were also preferences for *other options*, including semi-open or large open spaces. One participant

spontaneously mentioned her appreciation of the lawns with some trees in Prince Bay Park in Hangzhou.

“I want parks to have open spaces with some trees scattered. For example, some trees and lawns in Prince Bay Park. I often take my kid to this park, and he runs and plays on lawns. Kids can release their emotions in this environment.” (W34-2, younger adult group-2, Hangzhou)

5.2.5 Seasonal views

Participants also mentioned that specific views in different seasons influenced their park preferences. They mentioned that they preferred specific seasons and their related views in parks. These seasonal views can be categorised as 1) spring flowers, 2) summer green canopy trees, 3) autumn colourful foliage and 4) branch-trunk viewing plants/conifer trees in the winter. The descriptions of these four sub-aspects are inspired by participants' quotes.

Overall, *spring flowers* was mentioned more frequently than the other three seasonal aspects. There were references made that indicated that parks were considered more attractive in springtime compared with other seasons due to the flowers. For example, one Hangzhou participant mentioned the attraction of spring flowers, that is, peach blossom, in West Lake.

“I like parks with many flowers, and flowers often bloom in the spring. West Lake in the spring, you see peach blossom ... I prefer West Lake in the spring compared with other seasons.” (W60, older group, Hangzhou).

A few mentioned that they preferred certain parks in the summer because they could enjoy *summer green canopy trees*. For example, one Shanghai participant mentioned he preferred the green, lush and shady canopy trees in Houtan Wetland Park.

“They all talked about spring flowers. I may have a different opinion (laugh). I prefer green trees that provide shade in the summer, you know, very lush. Houtan Wetland Park has a great variety of large shade trees, and they are really green in the summer.” (M22, younger adult group-2, Shanghai)

Participants also talked about preferences for *autumn colourful foliage*, notably, leaves. One participant mentioned that colourful autumn leaves in parks were beautiful and that he liked to photograph them.

“I also like a park where I can see and photograph colourful views in the autumn because I’m very interested in photography. Many colourful leaves in the autumn are very attractive.” (M20, younger adult group-2, Shanghai)

Some participants talked about their preferences for winter and mentioned what was special for them, namely, looking at *branches and trunks of plants and conifer trees*. An older participant from Hangzhou (M74, older group) showed me a photo of a park in the winter and commented positively on the plants’ unique branches and trunks in the photo.

5.2.6 Other environmental aspects

Aesthetic value was mentioned as an important park aspect in both Hangzhou and Shanghai. References to this aspect included the importance of beautiful scenery and the presence of beautiful green plants. Participants also mentioned that *good accessibility* to parks was very important. Parks near homes or workplaces were preferred over those located further away. Another aspect was *congestion*. A peaceful and quiet park was generally preferred. Both Hangzhou’s and Shanghai’s groups, especially the older groups, paid attention to *safety* in parks.

The results mentioned above involved the nine main aspects of urban parks that participants considered important. Different age groups and different cities had somewhat different views in terms of the frequency some aspects were mentioned. *Facilities* was the most frequently mentioned aspect in both Hangzhou and Shanghai, although Shanghai’s participants contributed more to its discussion. In addition, Shanghai’s participants also mentioned *plants and*

wildlife more often than Hangzhou's participants. Middle-aged and younger adult groups mentioned *plants and wildlife* more frequently than older groups. The older groups discussed *maintenance* more often than other age groups. *Woodlands* and *seasonal views* were most often mentioned by younger adults.

5.3 Experiences of wild and traditional parks

Regarding experiences of wild parks, six key dimensions were identified: 1) facilities, 2) plants, wildlife and naturalness, 3) maintenance and aesthetic value, 4) memories/past experiences, 5) activities and 6) safety. Each dimension encompassed more than one sub-dimension. Figure 5.4 maps these six dimensions and 15 sub-dimensions.

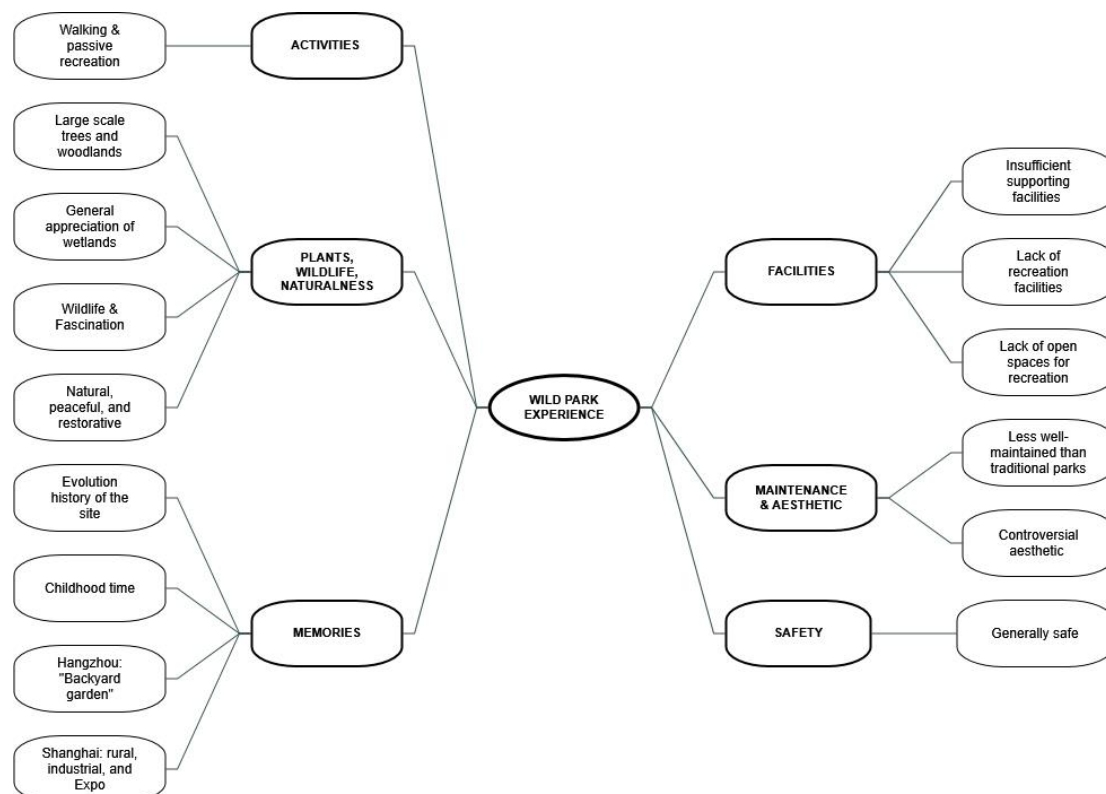


Figure 5.4 Six key dimensions and 15 sub-dimensions identified by analysing participants' experiences with wild parks

Regarding experiences of traditional parks, five key dimensions were identified:

1) facilities, 2) plants, wildlife, and naturalness, 3) maintenance and aesthetic value, 4) activities and 5) safety. Each dimension involved more than one sub-dimension. Figure 5.5 maps these five dimensions and the 10 sub-dimensions.

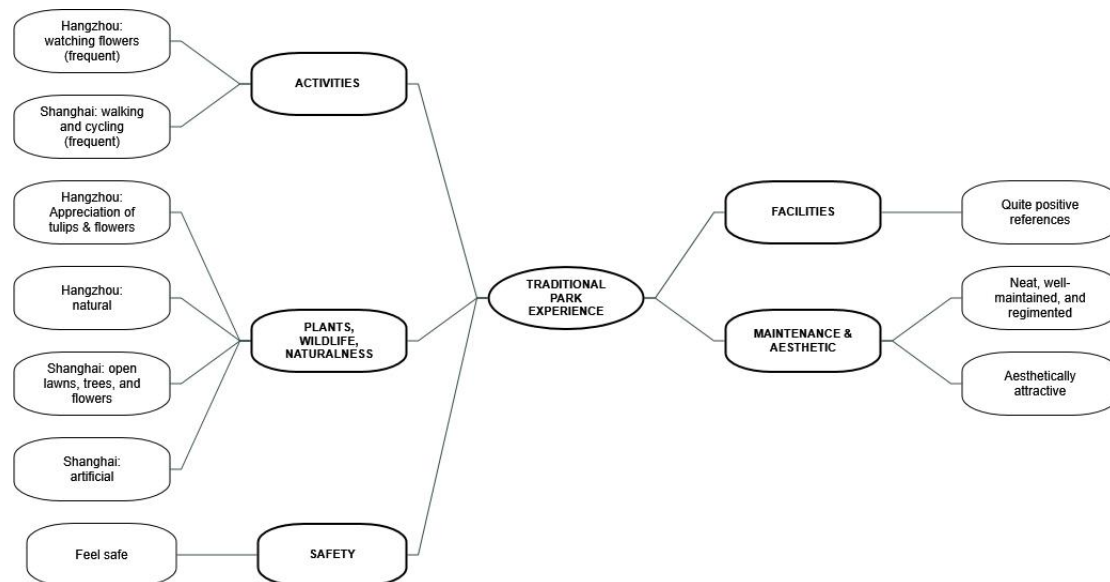


Figure 5.5 Five key dimensions and 10 sub-dimensions identified by analysing participants' experiences with traditional parks.

A more detailed presentation of participants' experiences with wild and traditional parks by city is provided below.

5.3.1 Facilities

5.3.1.1 Hangzhou

(1) Jiangyangfan Eco-Park

References to the facilities in Jiangyangfan Eco-Park were mostly negative. Participants complained about a lack of open spaces and facilities for flying kites or group folk dancing, unimpressive environmental interpretive signs, a lack of bins, the muddy footpath and inconvenient parking.

W34-2: My kid cannot run and play in this park. He cannot fly kites. No large spaces for usage ...

W29: You can only walk ... (From a conversation with younger adult group-2, Hangzhou)

“Jiangyangfan Eco-Park should add more educational environmental signs or boards to introduce plants and trees, for example, trees’ names, origins and ages. Prince Bay Park has an annual tulip exhibition, which attracts a lot of people.” (W47-3, middle-aged group-2, Hangzhou).

Two older participants complained about the dirt footpath at the entrance (Figure 5.6), as it is muddy on rainy days and dusty on sunny days. In the pilot study, an interview with one park manager revealed that the footpath at the entrance was intentionally designed as an eco-friendly, loose-gravel footpath. Designers believe that compared with concrete and slate, soft loose gravel absorbs water better, which is more conducive to water seeping into the soil, guaranteeing water exchange/adjustment between the footpath and the wetlands/plants. The manager called the footpath “an ecological footpath that breathes freely.” It seems the two participants understood that the footpath was designed to be ecological, but they still complained about its use and wanted it to be replaced by a square.

W60-2: I know Jiangyangfan is an ecological park, and for maybe ecological reasons, the footpath ... well, it is a dirt footpath. It will be dusty on sunny days and muddy on rainy days, you know, shoes will be a mess. That’s very uncomfortable.

W61: Probably a square is better than the dirt footpath ... (From a conversation with older group-2, Hangzhou)



Figure 5.6 The footpath was complained about by two older participants, as it is muddy on rainy days and dusty on sunny days (photographed by the author)

Several older participants appreciated the pavilion in the park, as it provided them with a good resting space. Two middle-aged participants appreciated the raised pontoon boardwalk through the wetlands and woodlands and found it convenient.

(2) Prince Bay Park

References to the facilities in Prince Bay Park were quite positive across the different age groups. A range of facilities were appreciated for providing convenience and offering room for different recreational activities, including lawns for family gatherings or picnics, a small church for weddings, a windmill-like convenience store serving food and water, good notice boards and signs and food stalls. According to one of the participants,

“Prince Bay Park has a range of recreation facilities. This is nice. You see lawns for picnics and also good notice boards and signs ... These signs introduce tulips.” (W34-2, younger adult group-2, Hangzhou)

5.3.1.2 Shanghai

(1) Houtan Wetland Park

There was dissatisfaction regarding the lack of play facilities for children, the insufficient number of bins, and the limited open spaces for family gatherings, picnics and ball games in Houtan Wetland Park. However, some participants, across all three age groups, mentioned that they liked the presence of a toilet, benches, tea houses and cafes and the path system. In particular, there were frequent positive references to the path system, which separates footpaths and paths for jogging, providing a sense of safety. The water terraces and natural waterfronts (Figure 5.7) were appreciated by some older participants. One older participant mentioned that the high flood defence wall had been replaced by water terraces and natural waterfronts, providing a comfortable spot to view the Huangpu River.

“In the past ... before the construction of Houtan Park, the flood defence wall was built very high. We had no opportunity to see the Huangpu River. Now, we have water terraces and natural plants ... We can enjoy the river directly, which is very comfortable.” (M67, older group-2, Shanghai)



Figure 5.7 Water terraces (left) and natural waterfronts (right) in Houtan Wetland Park (photographed by the author)

(2) Qiantan Recreation Park

The references to the facilities in Qiantan Recreation Park were generally quite positive across the three age groups. Participants talked about their appreciation of this park's squares and open spaces for exercising, the toilets, the lawns for picnicking and camping, and the slides, sand pits and play areas

for children. They also liked the nearby shopping malls and sport facilities/venues.

However, two older participants complained that the benches in Qiantan Recreation Park lacked shelters. They mentioned that there were not many large trees or woodlands to provide shade. It was considered necessary to add benches with shelters, otherwise it was very uncomfortable to walk in this park during hot days, especially in the summer. They wanted Chinese-styled pavilions or corridors that have shelters for resting.

M70-2: It has many resting facilities, such as benches, but such facilities do not have shelters. On hot days, I am really uncomfortable in this park. Unlike Houtan, which has trees and woodlands, Qiantan is very large, and it is dominated by lawns with only some small trees. I cannot find a shady place! I suggest we include pavilions or corridors, you know, they have shelters. I mean Chinese-styled pavilions or corridors.

M68: Yes, yes, like you said, include pavilions or corridors, and we can have tea and walks in this park. (From a conversation with older group-2, Shanghai)

5.3.2 Plants, wildlife and naturalness

Participants had more discussions about plants, wildlife and naturalness related to the wild parks than to the traditional parks. Since participants spontaneously mentioned these biodiversity-related elements (plants, wildlife and naturalness), they were asked to compare the diversity of plants and wildlife at the two park sites. In each city, most of the participants believed that the wild park had a greater diversity of plants and wildlife than the traditional park. When participants discussed plants, wildlife and naturalness, they also mentioned the different levels of congestion and woodland density at the two sites.

5.3.2.1 Hangzhou

(1) Jiangyangfan Eco-Park

Across the different age groups, participants mentioned the presence of many

trees and woodlands in Jiangyangfan Eco-Park, with both positive comments (giving the park fresh and clean air, cooling the environment and creating a natural ambience) and negative comments (appearing dense and dull; making active use of the park difficult, for example, ball games, picnics and jogging).

“I see many green trees. It’s very natural and the air is clean. But I still want to see more attractive things on an ecological basis. The park is quite dull now.” (W49, middle-aged adult group, Hangzhou)

“You go to Jiangyangfan, you feel you are in nature ... you go back to nature. Lots of trees and woodlands, and the air is so fresh, but I feel the park just has trees. We cannot picnic. We cannot have ball games.” (M43, middle-aged adult group, Hangzhou)

There was much interest in the presence of wildlife in Jiangyangfan Eco-Park among the three age groups. Participants talked positively about hearing beautiful birdsongs and seeing a variety of wildlife, such as birds, butterflies, waterfowl and squirrels, which captured their attention, in spite of a few complains about mosquitoes. This park’s contribution to wildlife/nature conservation was also mentioned.

“You see lots of birds in Jiangyangfan Eco-Park now. It’s very comfortable! I live in Baita Renjia, yes, near the park. I hear beautiful birdsongs every morning! I didn’t have this experience before. Wow! So many birds and birdsongs! The ecological environment is better. The park makes a great contribution to wildlife conservation.” (W60-2, older group-2, Hangzhou)

Words such as “natural,” “random,” “pristine,” “natural environment,” “wild” and “wild nature” were used to describe this park. However, the word “wilderness” was not used. Older and middle-aged participants tended to find the natural environment of this park positive due to the important psychological benefits they obtained, and they frequently used words such as “peaceful and quiet,” “relaxed,” “fresh air,” “enjoyable,” “comfortable,” “solitude” and “escape.” One middle-aged female participant said the park was like a wonderland after the rain. In addition, it made experiencing wild nature in an urban setting possible, without making a long journey to a rural area.

“It [Jiangyangfan Eco-Park] is in the city centre of Hangzhou, making it convenient for us to experience wild nature.” (W58, middle-aged adult group, Hangzhou).

Younger adult participants, however, had more complex attitudes towards the natural quality, and they tended to link it to the lack of maintenance (this is discussed in Section 5.3.3).

Several middle-aged adults and older participants appreciated the perceived peacefulness in Jiangyangfan Eco-Park, and they felt that, against the backdrop of COVID-19, it was safer to visit a park with few people around. For example, some participants spontaneously talked about the busy, crowded ambience and the over-presence of tourists in West Lake, Prince Bay Park and Fish Viewing Harbour Park, which they disliked.

W60: It is fortunate to have such a peaceful park in Hangzhou’s city centre. Due to the pandemic, people don’t like to go to places with many people, so they come here [Jiangyangfan Eco-Park]. There are few people around and it’s safe. If you go to places like West Lake, Prince Bay Park or Fish Viewing Harbour Park, you end up seeing people there ...

W74: These are busy tourist attractions. So many tourists! (From a conversation with the older group, Hangzhou)

The majority (27 of 32 participants) thought that Jiangyangfan Eco-Park harboured a greater diversity of plants and wildlife than Prince Bay Park, although the name of the park, that is, Jiangyangfan Eco-Park, as an obvious hint, might have impacted their responses. When asked to justify their evaluations, participants reported that Jiangyangfan Eco-Park was more natural, with less human disturbances; contained more trees, various wildlife and bird species; was more ecological; had woodlands and wetlands; and was more peaceful, good for the growth of plants and animals. Two participants considered Prince Bay Park more beneficial for ecological protection because of a perceived neatness and high-maintenance input. For these two participants, the perceived lack of maintenance of plants in Jiangyangfan Eco-Park meant

the park's ecological value was compromised.

All three age groups spontaneously stated that this park was an outdoor nature education venue, where students often visited to gain ecological knowledge of different flora and fauna species. Moreover, several older participants and younger adults mentioned that they could feel the natural cycles of plants' growth and death in Jiangyangfan Eco-Park, which they did not experience in Prince Bay Park. One older participant mentioned that the good ecological condition of Jiangyangfan Eco-Park helped to lower the air temperature.

"Jiangyangfan Park is ecological, not like Prince Bay Park. All the things in Jiangyangfan Park are growing on their own. They bloom in spring and are dormant in winter." (W74, older group, Hangzhou)

"Here [Jiangyangfan Eco-Park], the temperature is lower. Why lower? Good ecological environment and fresh clean air!" (W60-2, older group-2, Hangzhou)

Compared with the older participants' more positive attitudes towards the ecological values of Jiangyangfan Eco-Park, the middle-aged and younger adult participants had mixed evaluations: they cognitively knew ecological values and conservation were great, probably due to the strong publicity of ecological protection in Chinese society in recent years (one participant mentioned this factor), but it seemed that they could not directly experience the benefits of the ecological value in a perceptual/affective way in their everyday lives. For example, one middle-aged adult participant stated that she appreciated the ecological environment, yet, at the same time, she thought that the park was not visually attractive and interesting, and she could not directly sense the true benefits of an ecological environment.

"Most people just look around and walk in this park [Jiangyangfan Eco-Park]. They don't understand some of the ecological knowledge within it. That is to say, although the site is ecological and has not been interfered with too much, we just feel there are few things that can be appreciated ... Because we don't understand ecological issues. We just find the place has woods and vines and they look green." (W49, middle-aged adult group, Hangzhou)

(2) Prince Bay Park

As for Prince Bay Park, there were positive references to the ornamental tulips, flowerbeds and roses, with a specific reference to their aesthetic value. Some older participants spoke positively about the ordered layout and structure of the tulip plantings. Participants repeatedly said they liked tulips and related flower exhibitions and events in this park, but they also complained that residents could only enjoy them in March and April, which made the park busy and crowded in the spring. The overwhelming presence of people, including tourists, in Prince Bay Park in the spring was strongly and negatively addressed by participants from all three age groups.

“Prince Bay Park is laid out tidy. You can see that tulips are put in and different flowerbeds are put in. They are laid out in an ordered way. That’s nice.” (W74, older group, Hangzhou).

“Prince Bay Park is over-crowded and noisy in the tulip flowering season. So many people! I prefer places with fewer people.” (W60, older group, Hangzhou)

A few participants thought that the park’s ornamental tulips, flowerbeds and lawns emphasised its horticultural presentation, highly manicured and man-made.

“The park has too many artificial elements ... I mean, many flowers are cultivated and maintained. They are not natural. All the flowers are manicured ... They have been trimmed and manicured to become what they are now, but Jiangyangfan is not like this. They are all native and are naturally grown there. You can even find fallen trees.” (M34, younger adult group, Hangzhou)

References to the element of naturalness in Prince Bay Park were triggered by questions asked by the researcher. The answers indicated that Prince Bay Park was perceived as a natural place because of its green plants and water; however, it was considered less natural than Jiangyangfan Eco-Park.

W60-2: Jiangyangfan is very natural.

XLH: How about Prince Bay Park?

W67: Yes, it’s natural too.

W61 and W60-2: Yes, I also feel it is natural.

W67: It has a stream, lawns and green trees.

W60-2: But Jiangyangfan Park is more natural. It is more ecological ... It has more birds. Prince Bay Park is a bit ... the flowers are planted, and the beds are structured in lines.

M66: Of course, Prince Bay Park is less natural and ecological. (From a conversation with older group-2, Hangzhou)

5.3.2.2 Shanghai

(1) Houtan Wetland Park

The references to the wetlands¹⁴ and woodlands in Houtan Wetland Park were generally positive. The presence of wetlands and woodlands made participants feel comfortable and relaxed in highly dense urban Shanghai. The lush shade trees and the tall reed marshes were appreciated.

"Trees in Houtan are lush and dense, and there is a high greenery rate. This is different from Sanlin's green spaces, where the trees are short and thin and sparsely planted. But in Houtan, you feel like you're in a forest wetland park. I also see cress and woodlands." (W42, middle-aged adult group-2, Shanghai)

One younger adult participant stated that the woodlands in Houtan Wetland Park improved the air quality of this park. However, the woodlands were considered too dense and dull, blocking the Huangpu riverside scenery. This ambivalent attitude toward dense woodlands echoed the findings of Hangzhou.

"Houtan has many trees, and the air quality is, of course, good. Yes, Houtan has dense trees. But it has only dense trees. Boring. Large-scale trees also block the riverside scenery." (M20, younger group-2, Shanghai)

There were positive references to the diversity of plant species in Houtan Wetland Park. Participants mentioned that they had seen reeds, water lilies, *muhlenbergia capillaris*, hydrangeas and cress. Additionally, the older participants appreciated the agricultural crops and mentioned paddy rice, sunflowers, wheat, canola and sorghum. They believed these crops gave the park a rural atmosphere, which was largely considered valuable because

¹⁴ Most of the older participants described wetlands in Houtan Wetland Park as streams or ponds.

today's urban residents rarely had the opportunity to experience the countryside. Some older participants considered the crops an educational tool for urban children to have an outdoor nature learning experience.

Similar to in the case of Hangzhou, all three age groups mentioned the wildlife they had encountered in Houtan Wetland Park in a delighted tone. References to the wildlife they had seen included tadpoles, frogs, fish, waterfowl, egrets and other birds. Two older male participants said they often saw older residents watch and take pictures of birds.

"And if you look at the reeds by the river, there are different kinds of birds there. Big birds, like egrets, and other, little birds. A lot of birds. It's kind of ecological and pristine. I often see people, especially older people, there watch birds and take bird photos." (M68, older group-2, Shanghai)

Words such as "natural," "nature," "natural scenery," "peaceful," "rural" and "countryside" were repeatedly used to describe Houtan Wetland Park. Older participants frequently used the words "rural" and "countryside" to describe this park. Participants indicated they were fortunate to have the opportunity for a natural and rural experience in dense, built-up urban Shanghai.

"Because there are fewer people there, it's very good to take a walk, and the natural scenery is good. Like they discussed, the rural atmosphere ... wheat and reeds ... Shanghai is such a big, artificial city, and we rarely go to the countryside now. Here, it has a strong rural feeling ... very nice ... You go there and walk." (W65, older group-2, Shanghai)

"The scenery at Houtan is very ... very close to nature. The park brings back nature. I get a sense of being near nature in this park. It nears the Huangpu River ... and the large-scale. It gives me a feeling of going back to pure nature. Not artificial ... no hard, constructed things ... It makes me feel like I'm in a rural area, yes, a rural area, though the park is in the city centre. I feel like I'm in a rural area." (M29-4, younger adult group-2, Shanghai).

When participants mentioned the natural quality of Houtan Wetland Park, words and phrases such as "relaxed," "less stressful," "fresh air," "comfortable" and "river's breeze" emerged. The park is located at the end of the Huangpu River,

and it is quieter and more peaceful than the riverside tourist attractions at the head and middle of this river. One middle-aged female participant reported that she often went for a walk in this park after work to relax, stating that

“This park is by the riverside [the Huangpu River]. I often go there after work to feel the blowing wind. It is very calming, and I feel comfortable and less stressed.” (W44, middle-aged adult group-2, Shanghai).

Houtan Wetland Park was mentioned as harbouring a greater diversity of plants and wildlife than Qiantan Recreation Park because of, in participants' words, the higher greenery rate, the existence of wetlands and woodlands, and the presence of a variety of plant and wildlife species in this park. Interestingly, one older participant spoke positively about the park's ecological functions of flood prevention and water cleaning. A younger adult participant considered the park as a green island in the city's centre for mitigating heat and reducing pollution and other urban environmental problems. Another younger adult participant mentioned that the park worked as a habitat for conserving different wildlife species.

(2) Qiantan Recreation Park

There were fewer references to the plants in Qiantan Recreation Park. Some participants mentioned that they liked the lawns scattered with trees in this park, as they provided more open views to appreciate compared with the dense woodlands in Houtan Wetland Park.

“There are lawns in Qiantan, and there are places where you can directly see the lawn in front of you from the footpath, and then the lawn extends all the way to the Huangpu River. You can't find this kind of open space in Houtan.” (M20, younger adult group-2, Shanghai)

None of the participants spontaneously mentioned wildlife in Qiantan Recreation Park. The park was frequently referred to as an artificial park, since participants saw many hardscape elements, including buildings, squares, stairs and recreation facilities. Words such as “artificial,” “square-like” and “urban-like”

were used. Two participants felt Qiantan Recreation Park had a “cultural atmosphere,” in contrast to the “natural atmosphere” in Houtan Wetland Park.

5.3.3 Maintenance and aesthetic quality

5.3.3.1 Hangzhou

(1) Jiangyangfan Eco-Park

Almost all participants considered Jiangyangfan Eco-Park to be in a low-intensive maintenance condition. Participants reported that they had encountered spontaneous natural plants, unmown grass and messy swamps and ditches. Three younger adult participants also reported litter, dirtiness and cobwebs. Interestingly, almost all older participants were not much against the low-maintenance condition. Rather, they wanted Jiangyangfan Eco-Park to keep its current maintenance system and maintain its natural atmosphere.

“The park is natural, and plants are growing naturally on their own. We don’t want too much human maintenance or interference. They don’t fit the park.” (M74, older group, Hangzhou).

However, most middle-aged and younger adults complained about the lack of maintenance and the presence of many “weeds” (according to participants’ descriptions), suggesting a certain level of maintenance was needed.

“And the lack of maintenance ... You see litter in this park. I know this is a wild ecological park, but things like weeds, fallen branches ... I mean, you can still clean them up. Do not let people feel that the place is uncared for.” (W26-2, younger group)

When discussing maintenance, participants were asked if they had impressions of dead trees and wood in this park and how they perceived them. Interestingly, almost all older participants and most of the middle-aged and younger adult participants reported their acceptance of them in this park. They felt these dead trees and wood were natural and ecological.

W60: I’m quite okay with them. The trees fall down because they naturally

grow in swamps, and some of them are not firmly rooted. They are ecological. It is an ecological phenomenon.

W74: This is natural.

W60: Yes, sometimes it falls in an optimal position or angle, and it looks very beautiful. (From a conversation with the older group, Hangzhou)

A few middle-aged participants said their acceptance was based on their ecological understanding of these trees and wood but that most of the general public had little related ecological knowledge to appreciate them. One participant linked dead trees and wood to the aesthetic notion of decaying lotus in classical Chinese poetry.

W47: I know they grow naturally in swamps.

W35: They are not manicured.

W47: I think the acceptance is based on people's understanding and ecological knowledge. If we just look at them, they look messy.

W49: Yes, we don't understand them. They look very messy and untidy.

W47: If you have an environmental interpretation or explanation telling us that this is the way they grow ... We can only accept them if we understand them.

W35: The theme of the park is nature ...

W49: But most people still think they ...

W47: Messy.

W49: Most people cannot feel the benefits of ecology. Unlike ecologists or researchers, the general public loves visually attractive things. They feel dead wood is uncared for. In fact, just like decaying lotus ... they have their own beauty ... a kind of natural beauty, but this kind of beauty tends to be ignored by most people. (From a conversation with the middle-aged adult group, Hangzhou)

There were not many references to the aesthetic quality of Jiangyangfan Eco-Park during the discussions. A few participants mentioned that this park was visually unattractive, and words such as “monotonous,” “just green” and “dull” were used to describe this feeling.

“I don't quite see that it is a designed park, I mean, an intentionally designed park. A small, neat neighbourhood park near my community is more attractive than this park.” (W29, younger group-2, Hangzhou)

(2) Prince Bay Park

Overall, Prince Bay Park was perceived positively as neat and clean. When participants talked about the park's perceived neatness, they also mentioned that it was aesthetically attractive and more beautiful than Jiangyangfan Eco-Park. It seemed that the neatness of this park contributed to its aesthetic value. Moreover, the tulips and flowers in this park were also indicators of the aesthetic value, as words such as "beautiful," "attractive" and "ornamental" were often used to describe the tulips and flowers. Lawns scattered with some trees in this park were also recognised for their aesthetic value, as words and phrases such as "picturesque," "like a picture," "scenic and beautiful" were used. One female participant mentioned that she appreciated the combination of lawns, clumps of trees and the stream in this park. She specifically mentioned the association between the stream in this park and West Lake.

"Prince Bay Park has lawns, clumps of trees and a stream. I suppose all these things ... the combination of them is very scenic, like a picture! The water in the stream is linked to West Lake!" (W47-3, middle-aged adult group-2, Hangzhou)

5.3.3.2 Shanghai

(1) Houtan Wetland Park

Compared with the mixed attitudes towards the maintenance of Hangzhou's Jiangyangfan Eco-Park, participants in Shanghai seemed to be more satisfied with Houtan Wetland Park's maintenance. The park was generally considered as a cared-for park and was maintained to some degree but not very neat and regimented. For example, some participants mentioned that the park looked natural and wild but that they knew it was maintained, as they saw park cleaners and managers. One participant felt that this park looked very different from the neat and highly maintained green spaces, for example, Yan Zhong Green Space, in Shanghai's city centre. However, she still felt the park was cared-for and was satisfied.

W42: Well, the park looks cared-for, but it is not very regimented. It looks natural. It has natural plants. Houtan [Wetland Park] is obviously different from the neat and manicured green spaces in the city centre.

XH: Which green spaces are you referring to?

W42: Like Yan Zhong Green Space. It is maintained at a higher level and is very neat. (From a conversation with middle-aged adult group-2, Shanghai)

Another participant compared Houtan Wetland Park with Jinhai Wetland Park (also a wild park in Shanghai) and Qiantan Recreation Park. She felt that Houtan Wetland Park was maintained at a level between Jinhai Wetland Park (considered not maintained) and Qiantan Recreation Park (considered highly maintained). She thought Houtan Wetland Park looked wilder and more natural than Qiantan Recreation Park but tidier than Jinhai Wetland Park.

"Houtan is natural and wild ... but this depends. I've been to Jinhai Wetland Park, and that place looks undeveloped, without any signs of maintenance ... It is more natural and wilder than Houtan ... But if you compare it with Qiantan, I suppose Houtan looks wilder. So Houtan is in the middle where maintenance is concerned." (W45, middle-aged adult group-2, Shanghai)

The perceived aesthetic quality of Houtan Wetland Park was quite controversial; some of the participants found the park aesthetically attractive, whereas several others did not. Rather, they found it looked dull and visually unattractive. The words used to describe the positive feelings associated with the perceived aesthetic quality of this park included "diversity," "flowers," "beautiful" and "riverside scenery."

(2) Qiantan Recreation Park

Almost all references to the maintenance of Qiantan Recreation Park were positive. Participants mentioned that the park was neat, clean and well-kept. Their references to the neatness and cleanliness of this park also involved the perceived aesthetic quality, which was largely positive as well.

"Qiantan is clean ... It is well kept ... No litter and weeds. This is nice. The park is very attractive and beautiful." (W67, older group, Shanghai).

Words such as "flowers," "ornamental," "flowers and lawns," and "scenic" were also used. One participant stated that the combination of lawns, trees and

flowers in Qiantan Recreation Park contributed to its aesthetic quality.

“I really prefer lawns with some trees and flowers. I mean lawns ... large-scale lawns. This is attractive and scenic. I can find this in Qiantan Recreation Park.”
(M20, younger adult group-2, Shanghai).

5.3.4 Wild park sites and memories/past experiences

Interestingly, in each city, many older participants frequently talked about their memories of and past experiences with the original landscapes of the wild park sites. However, none of the middle-aged and younger adults mentioned memories or past experiences. It seemed the wild park sites had an evocative quality that reminded older participants of their past experiences. However, this quality was not identified in discussions about the traditional park sites.

5.3.4.1 Hangzhou: Jiangyangfan Eco-Park

Almost all older participants spontaneously mentioned that they knew the evolution and history of Jiangyangfan Eco-Park, from it being a low-lying land with open fields to it becoming an abandoned site containing the sludge dug from West Lake, spontaneously evolved woodlands and wetlands and, finally, to today's new park. This history and evolution were not spontaneously mentioned by any of the middle-aged and younger adult participants.

Four older participants mentioned that they grew up near the site and witnessed the evolutionary changes at this location. They mentioned that there were natural ponds, a small hill with tea trees, and fields in the original low-lying land, and they used to play around the ponds during their childhood. Today's Jiangyangfan Eco-Park also has natural ponds. The small hill was preserved, which evoked their memories of happy childhoods.

W60-2: We grew up here ... the local area ... it was initially low-lying land, and it had fields, ponds and a small hill with tea trees. We used to play here ... we were very happy.

M66: At that time, there was a small hill. Half of it belonged to the Siye Group and half belonged to us. We had many tea trees on this hill. And ponds as well ... many ponds and tea trees. Later, the sludge dug from West Lake was placed here and you know ... the hill was still preserved here ...

W60-2: Yeah, it was here. Jiangyangfan also has many ponds, which often reminds me of my childhood.

M66: Yeah ... yeah ... very happy.

W61: We grew up here ... Yes, we used to play here. (From a conversation with older group-2, Hangzhou)

Three older female participants were happy that the spontaneous woodlands and wetlands that developed on the sludge were conserved. They used to walk around the woodlands and wetlands before the park was constructed. They were happy that they could still see the woodlands and wetlands and use the site for walking.

“The sludge dug from West Lake ... in 1999 ... the site contained the sludge from West Lake. Then, about six years later, the site was full of woodlands and wetlands. We used to walk around them. In 2005, the government planned this park. The park conserves the original ecology. We’re quite satisfied. We can still see the woodlands and wetlands and walk ...” (W74-2, older group, Hangzhou)

Notably, four older female participants felt that Jiangyangfan Eco-Park was an inseparable part of their everyday lives because they used it for their daily walks. They felt at home in this park because the park was quiet and mainly used by the local community’s residents. One older female participant called Jiangyangfan Eco-Park their “backyard garden.” By contrast, they said Prince Bay Park was very busy and predominantly used by tourists. Due to the tourists and it being crowded, they did not feel at home in Prince Bay Park and were less willing to use it.

W60: I walk there [Jiangyangfan Eco-Park] ... every day. It is our backyard garden. I feel at home in this park. It is peaceful, and it is used by our neighbours rather than tourists. That’s nice.

W74: Prince Bay Park is different. It’s very busy, and you see many tourists, which I don’t really like. (From a conversation with the older group, Hangzhou)

5.3.4.2 Shanghai: Houtan Wetland Park

In Shanghai, eight of the 12 older participants spontaneously mentioned the evolution of Houtan Wetland Park. One older male participant spoke about the history of the conserved wetland and its contribution to wildlife conservation. He described the remnant wetland as a “precious cultural relic” and was happy it had been conserved rather than cleaned up. He considered that this wetland held his childhood memories, as he used to spend time there with his friends when he was young.

W67: The wetland and aquatic plants already existed when this place had many iron and steel factories. It is a natural land. Before the liberation¹⁵, this place was a small fishing village. Birds inhabited this wetland. The wetland was fenced off, and no one interfered. It was just very natural, and there was no special protection for it. It is because of the World Expo that this wetland has intentionally been protected and has not been destroyed.

XLH: Do you have any other memories of this wetland?

W67: Well, the land was formed naturally, at the corner where the Huangpu River turns. We used to play nearby, and I remember there were many green aquatic plants. The wetland was very beautiful ... It holds my childhood memories. I think it is a precious cultural relic. Different birds such as seagulls lived in it. The other wetland and the plants in Houtan Park were added later. The protected wetland is very precious. It is a treasure. (From a conversation with older group-2, Shanghai)

One older female participant felt that the park often evoked memories of the time of the Expo (2010), and she requested adding more Expo-related elements to this park. A group of older participants said that the crops and the steel structure of a former industrial building often reminded them of the rural and industrial history of the Pudong area and their lives at that time. They felt fortunate that this park provided them with a place to reflect on old times, which is very precious in today’s dense Pudong, where unprecedented rapid urbanisation continues.

“We are old. We like to think about our past. This park often evokes memories and past experiences. It has the image of our rural and industrial Pudong. We

¹⁵ “Before the liberation” is often used by Chinese people in their day-to-day lives, usually referring to the Republic of China period (1912–1949).

are fortunate to have this kind of place in urban Shanghai.” (M67, older group-2, Shanghai)

5.3.5 Activities

Participants also talked about their activities at the two park sites (Tables 5.1 and 5.2). Walking was very popular in the wild parks in both cities. In addition to walking, the wild parks were most often used for passive activities, such as sitting and relaxing, appreciating nature and watching plants and wildlife. In Shanghai, the traditional park was also used for active recreational activities, such as cycling. In Hangzhou, the traditional park was mostly used for watching flowers and participating in flower exhibitions. Notably, one Shanghai participant said that he used Houtan Wetland Park to enjoy the rural-like atmosphere in the city centre. One older participant mentioned that he often went to Houtan Wetland Park to recall the local area’s past industrial history because of some industrial relics conserved in this park.

Table 5.1 Activities in Jiangyangfan Eco-Park and Prince Bay Park in Hangzhou (Numbers within brackets indicate the number of participants who mentioned this activity)

Activities in Jiangyangfan Eco-Park			Activities in Prince Bay Park		
Walking (12)	Having snacks and tea (5)	Sitting and relaxing (3)	Watching flowers/participating in flower exhibitions (12)	Watching the scenery (4)	Walking (3)
Appreciating nature (3)	Taking photos (3)	Having meals in the nearby restaurant (3)	Picnicking (3)	Taking photos (2)	Playing (2)
Watching randomly (1)	Watching the scenery (2)	Chatting (2)	Letting children run on the lawns (1)	Taking children out (1)	Jogging (1)
Playing (2)	Breathing fresh air (1)	Climbing nearby hills (1)	Having tea (1)		
Looking at the signs with information about the flora and fauna (1)	Listening to music (1) ¹⁶	Playing cards (1)			

¹⁶ Sodcasting is not allowed in Jiangyangfan Eco-Park. According to the participant who mentioned this activity, music can only be played via headphones.

Table 5.2 Activities in Houtan Wetland Park and Qiantan Recreation Park in Shanghai
(Numbers within brackets indicate the number of participants who mentioned this activity)

Activities in Houtan Wetland Park			Activities in Qiantan Recreation Park		
Walking (16)	Watching the scenery of the Huangpu River (6)	Watching plants and birds (4)	Walking (7)	Cycling (5)	Watching the scenery of the Huangpu River (4)
Taking children to see plants (3)	Taking the children and letting them have a day of play (3)	Taking photos (3)	Watching the scenery (4)	Camping (3)	Watching the night scenes (3)
Watching the marina (3)	Watching the night scenes (3)	Having drinks (2)	Enjoying the wind from Huangpu River (2)	Having drinks (2)	Jogging (2)
Jogging (2)	Playing (2)	Sitting and relaxing (2)	Taking the children and letting them have a day of play (2)	Using sport facilities (2)	Picnicking (2)
Sunbathing (2)	Having snacks (2)	Watching the scenery (2)	Playing Tai Chi (2)	Morning exercise (1)	Painting (1)
Breathing fresh air (1)	Chatting (1)	Cycling (1)	Playing (1)	Reading (1)	Relaxing (1)
Enjoying the rural-like atmosphere in the city centre (1)	Enjoying the wind coming off the Huangpu River (1)	Remembering the area's industrial history (1)	Sitting (1)	Sunbathing on the lawns (1)	Taking photos (1)
Painting (1)	Reading (1)	Picking reeds (1)	Watching flowers (1)	Ball games (1)	Exercising (1)
Exercising (1)					
			Having snacks (1)		

5.3.6 Safety

Participants did not spontaneously mention feelings of safety. Perceptions of safety, thus, were triggered by the question of whether participants visited the two parks alone or with others. Overall, in each city, most participants visited each of the two parks with others. However, this was not for safety reasons, i.e. being afraid to visit alone. Participants found it more interesting to enjoy the parks with friends and family members. Two participants went to Jiangyangfan Eco-Park alone to enjoy the peaceful environment and get a sense of escaping the noisy urban environment. In each city, it seemed that most participants felt safe in both parks.

However, two older female participants in Hangzhou conveyed their safety concerns about Jiangyangfan Eco-Park. This park contains large-scale swamp areas, and they were concerned about the possibility of accidentally falling into a swamp. In addition, the dense woodlands in this park sometimes made them feel unsafe.

W60: We cannot visit the [Jiangyangfan] ecological park in the evening for the sake of safety. The swamps in the park are more than a metre deep.

W74: Yes, the swamp and the mud. A few metres deep.

W60: The park is closed in the evening. After 5 pm, the park is closed. We thought it would be nice to have a walk there, you know, as we live close to the park. But they close the park in the evening, and we cannot get into it because of safety concerns.

W74: The swamp ... If you fall, you fall in ... because it is a swamp.

W60: Yes, marsh and mud.

W74: Yes, the park was built on this. Swamps and dense trees and woodlands ... you know, frightening. The park should be closed in the evening because there are several risks.

XLH: Do you support the management's decision to close the park after 5 pm?

W74: Yes, yes. We support this ... The park has wardens. Great. (From a conversation with the older group, Hangzhou)

5.4 Environmental interventions for wild park sites

5.4.1 Adding more facilities

For Jiangyangfan Eco-Park, a variety of supporting and recreational facilities were suggested, including squares for group folk dancing, a flat and sealed entrance footpath, convenient car parking, more bins, lighting, and play facilities for children. It was also suggested that these interventions should be done discreetly to avoid disrupting the park's ecological environment and turning it into an ornamental/recreation park, like Prince Bay Park. As for Houtan Wetland Park, affordable mobile food trucks, play facilities for children and more bins were mentioned.

For both wild parks, a complete and interesting environmental interpretive system and related facilities, such as a nature education museum, more striking and interesting boards or signs, and audio or video interpretation devices to introduce the park (similar to the devices used in museums), were requested. Participants indicated environmental interpretation was important for them to gain ecological knowledge and information about the parks, including parks' history, design and maintenance strategies and efforts, and plant and wildlife species, which they were very interested in.

5.4.2 Maintenance and care

Regarding Jiangyangfan Eco-Park, basic maintenance, such as picking up litter and not allowing facilities to become overgrown, was requested by a number of middle-aged adults and younger adults to show the park was cared-for. The older participants seemed less sensitive to such issues. Dead trees and wood were generally considered acceptable, and interpretive signs to present

ecological information were requested by some middle-aged adults. Notably, a number of participants indicated that they did not want Jiangyangfan Eco-Park to look very regimented, tidy and controlled but that they wanted to see cleanliness and evidence of managers' care and maintenance of the park. Participants in Shanghai seemed to be generally satisfied with Houtan Wetland Park's maintenance.

5.4.3 Semi-open spaces

It was also requested that certain areas should be more open to provide room for recreational activities, such as flying kites and having picnics, family gatherings and ball games. In addition, several participants considered open areas aesthetically attractive and safer than dense woodlands. However, very open spaces with only a few trees were not considered appropriate, especially in the summer, because people would be uncomfortable without large shade trees on hot days. Thus, a compromise between very dense woodlands and very open spaces consisting of a mosaic of dense woodlands and open spaces or semi-open spaces would help satisfy divergent expectations and needs and would be appropriate.

5.4.4 Public events/Expo-related elements

Several middle-aged participants mentioned that Jiangyangfan Eco-Park used to have many ecology-related public events, such as the Wildflower Festival and Butterfly Valley, but that those events were no longer held. They wanted this park to have more interesting events and suggested guided tours and vegetation picking and foraging. Two Shanghai participants said they wanted to see more Expo-related elements in Houtan Wetland Park, such as a small museum or some sculptures.

5.5 Preferences between wild and traditional park sites

5.5.1 Preferences for traditional park sites

In each city, participants had a range of responses regarding preferences between wild and traditional park sites. In Hangzhou, the majority of the participants, especially younger adults and middle-aged participants, preferred Prince Bay Park because it had beautiful tulips and flowers, had more open views, had more facilities and open spaces for activities, and it was neat, clean and scenic. Several participants said they preferred Prince Bay Park because it was more well-known than Jiangyangfan Eco-Park in Hangzhou. Two participants also mentioned the good environmental interpretive signs in Prince Bay Park as an attraction factor.

However, some older participants showed more enthusiastic preferences for Jiangyangfan Eco-Park mainly because it was peaceful and had fewer tourists, had fresh air, was natural and good for nature conservation with diverse wildlife and plants, and often evoked memories of past experiences.

5.5.2 Visit purposes or seasons

In Shanghai, many participants indicated their preferences were not constant and would be depended on visit purposes or seasons. Participants indicated they liked Qiantan Recreation Park for family gatherings and meetings with friends, whereas Houtan Wetland Park was more suitable for solitude and respite from the city. Some older participants reported that Houtan Wetland Park was preferred because it evoked memories of old times, which was an important reason for their preferences.

Seasons influenced participants' preferences in both cities. In Hangzhou, several participants preferred Prince Bay Park in the spring because of the ornamental tulips and flowers, which were absent from Jiangyangfan Eco-Park. In the summer, they preferred Jiangyangfan Eco-Park for its shady woodlands, which helped to lower the air temperature. They had no obvious preferences between the two parks in autumn and winter. In Shanghai, some participants mentioned that their preferences depended on seasons. Houtan Wetland Park was preferred in the summer because of its large shade trees and woodlands, and it was preferred in the autumn because of its mature crops. Qiantan Recreation Park was preferred in spring and winter because of its open lawns for sunbathing on sunny days.

5.6 Understanding of biodiversity

During the discussions, participants spontaneously mentioned biodiversity-related words and phrases (e.g. wildlife, diversity, wildlife, species and ecological). I asked for details on their understanding and perceptions of biodiversity, including whether they had heard of the term biodiversity, how they understood the term, and their mental images of parks with high and low biodiversity levels.¹⁷ Three dimensions were identified: 1) lack of knowledge, 2) richness/diversity of plants and animals, and 3) natural, ecological and interconnectedness.

5.6.1 Lack of knowledge

In Hangzhou, some participants (middle-aged and older participants) reported their lack of knowledge of the term biodiversity, as they had not heard of the

¹⁷ In group discussions, those who had not heard of the term biodiversity were not asked about their specific understanding and perceptions of this term.

term. In Shanghai, some participants (older participants) also indicated their lack of knowledge. One older participant stated that this was a professional or scientific word and that she, as a member of the general public, did not have many feelings about it.

“We don’t know much about it. Experts and scientists know it. We are the general public ... We don’t pay much attention to it.” (W60, older group, Hangzhou)

5.6.2 Richness/diversity of plants and animals

In Hangzhou, the majority of the participants (younger adults and middle-aged adults, one older participant) mentioned that they had a general feeling that the term biodiversity was related to the richness or diversity of plants and animals; however, the term was not frequently used in their daily lives. Similarly, the majority of the Shanghai participants (younger adults and middle-aged adults) related the term to the richness or diversity of plants and animals. Participants mentioned that they got to know the term biodiversity through social media and television programmes. Two younger adults, one from Hangzhou and one from Shanghai, indicated that they had learned the term biodiversity in high school and had watched programmes and documentaries about biodiversity.

“I know this word from high school, but I don’t pay much attention to it now. I remember that I watched Animal World before ... You know ... Some programmes on CCTV and social media introducing wildlife, plants and biodiversity.” (W26, younger adult group, Hangzhou)

In both cities, some participants, especially younger adults, specifically associated the term biodiversity with flora and fauna species. For example, one younger adult from Shanghai stated that the term was related to flora and fauna species and mentioned bird species in particular:

“It is related to flora and fauna species. For example, we see different bird species in wetland parks. These parks protect species and provide them with habitats.” (M29-3, younger adult group-2, Shanghai)

Participants were generally able to distinguish different levels of biodiversity supported by parks at a coarse scale, and their distinction between the different levels involved a few common words, which might indicate the consistency with which the participants perceived differences in biodiversity levels. Participants' mental images of a biodiverse park involved descriptions such as "rich in plant and animal species," "plant and animal species diversity" and "wildlife." Phrases used to describe a park with low-level biodiversity included "lack of diverse plants and animals," "non-ecological, cannot see wildlife" and "artificial."

5.6.3 Natural, ecological, and interconnectedness

Participants' understanding of the term biodiversity also involved other, more abstract descriptions, including natural, ecological and interconnectedness. Participants stated that biodiversity existed in natural environments and that these environments tended to be ecological. Biodiversity was also perceived as something that humans were closely interconnected with and dependent upon.

W47: In my opinion, biological existence is a biological chain. Species exist for their own reason. If you do not love it ... or if you hate it or drive it out, then a link will be broken and may damage the environment ...

W49: It relates to our lives. We cannot destroy it, of course. (From a conversation with the middle-aged adult group, Hangzhou)

I've heard about the word ecosystem ... I mean ... I have a feeling that wildlife, humans and plants are a system. (W26, younger adult group, Hangzhou)

5.7 Summary

Some key conclusions can be drawn from the results of the focus groups. These conclusions are presented below.

1. Important environmental aspects of urban parks
1.1 Participants talked about the importance of plants and wildlife to their appreciation of parks.
1.2 The overall ranking of all the important park aspects, from the most to the

least total number of times they were mentioned, is: 1) facilities, 2) plants and wildlife, 3) maintenance, 4) woodlands, 5) seasonal views, 6) aesthetic value, 7) accessibility and location, 8) level of congestion, and 9) safety.

2. Experiences of wild and traditional park sites

2.1 Facilities

- (1) Hangzhou: Participants complained about a lack of diverse facilities in Jiangyangfan Eco-Park (notably strong among middle-aged and younger adults). References to the facilities in Prince Bay Park were quite positive.
- (2) Shanghai: The references to the facilities in Qiantan Recreation Park were more positive than the references to the facilities in Houtan Wetland Park. Some references to the facilities in Houtan Wetland Park were positive, but other participants expressed dissatisfaction (e.g. the lack of play facilities and few open spaces for activities).

2.2 Plants, wildlife and naturalness

- (1) Hangzhou: Participants mentioned trees and woodlands in Jiangyangfan Eco-Park, with both positive and negative connotations. This park was strongly associated with restorative effects. Most participants felt that Jiangyangfan Eco-Park harboured a greater diversity of plants and wildlife than Prince Bay Park.
- (2) Shanghai: The presence of wetlands, woodlands and wildlife in Houtan Wetland Park made participants feel relaxed and less stressed in highly dense urban Shanghai. The majority believed that Houtan Wetland Park contained a greater diversity of plants and wildlife than Qiantan Recreation Park.

2.3 Maintenance and aesthetics

- (1) Hangzhou: Almost all participants considered Jiangyangfan Eco-Park to be in a low-intensive maintenance condition; however, not all considered this to be negative, as some felt it was natural. Most participants found Prince Bay Park more aesthetically attractive.
- (2) Shanghai: Qiantan Recreation Park was perceived as a well-maintained park, whereas Houtan Wetland Park was considered less well-maintained but still cared-for.

2.4 Wild park sites and memories/past experiences

In both cities, many older participants talked about their past experiences with and memories of the wild park sites, including the sites' history and their childhood and more recent experiences with the sites.

2.5 Activities

Walking in wild parks was very popular in both cities. Wild parks were also frequently used for passive activities, such as sitting and relaxing and appreciating nature. Qiantan Recreation Park was mainly used for walking and cycling. Prince Bay Park was mostly used for watching flowers and participating in flower exhibitions.

2.6 Safety In each city, participants generally felt quite safe in both two parks.
3. Environmental interventions for wild park sites
1) More supporting and recreation facilities were requested; 2) More semi-open areas were preferred; 3) More care and maintenance were requested for Jiangyangfan Eco-Park; 4) More public events in Jiangyangfan Eco-Park and more Expo-related elements in Houtan Wetland Park were requested.
4. Preferences between wild and traditional park sites
Participants had a range of responses regarding preferences between wild and traditional park sites. In Hangzhou, it seems Prince Bay Park received more enthusiastic responses. In Shanghai, many participants indicated their preferences would be depended on visit purposes or seasons.
5. Understanding of biodiversity
5.1 In each city, the majority of the participants, including all younger adult participants, reported that they had a general impression of the term biodiversity, yet the term was not frequently used in their daily lives. Most of them considered the term to be associated with the richness and diversity of plants and animals. Most older participants reported they had not heard of the term biodiversity. 5.2 Words and phrases such as “wildlife,” “plant and animal species diversity,” “rich in plant and animal species,” “quiet” and “natural” were frequently used by participants to describe their mental images of a biodiverse park. Words and phrases used to describe a park with a low biodiversity level included “lack of diverse plants and animals,” “non-ecological, cannot see wildlife” and “artificial.”

Chapter 6: Results of conjoint analysis

6.1 Introduction

This chapter presents findings from quantitative conjoint analysis. Conjoint analysis used species richness of flora and fauna as indicator for “biodiversity.” Conjoint analysis results include:

- 1) Section 6.2: Results of utility values and the attribute average importance analysed from the Hierarchical Bayes (HB) model to uncover which level of species richness is preferred by the public and public perceptions of the relative importance of species richness (research questions 1 and 2, involved in research objective 1).
- 2) Section 6.3: Correlations between attributes and between levels for revealing the interactions between public preferences for species richness and for other park attributes (research question 3, involved in research objective 1).
- 3) Section 6.4: Share of preference between wild and traditional park scenarios to unveil public preferences between the two park styles and environmental interventions that would make the wild style more attractive (research questions 5 and 6, involved in research objective 2).
- 4) Section 6.5: Results from statistical tests and regressions for examining preferences for species richness and park styles between different sociocultural groups of the public, and between the public and ecology/landscape professionals (research question 7, involved in research objective 3).
- 5) Section 6.6: Additional output: *Build Your Own (BYO)*, *Must-Haves* and *Unacceptables*, *Winning Concept* and respondents’ descriptions of wild and

traditional park styles and their perceived species richness of the two park styles.

Sections 6.2, 6.3, and 6.4 are results from public respondents, including the whole public sample (Hangzhou and Shanghai public respondents combined), the Hangzhou public sample, and the Shanghai public sample, respectively. Sections 6.5 and 6.6 involved comparisons between public and professional respondents.

6.2 Utility values and the average importance of attributes

6.2.1 Utility values

Figure 6.1 below presents the utility value for each level of the five attributes within the whole public sample. Figure 6.1, along with tests of differences between utility values, shows that within the total public sample, “species rich flora and fauna” had a significantly higher preference than “species moderate flora and fauna”, which again had a significantly higher preference than “species poor flora and fauna” (for details of statistical differences between utility values, see Appendix C-1). This indicates that higher species richness in parks was preferred over lower species richness, showing that species richness was preferred and demanded by the public respondents. “Supporting facilities & recreation/play facilities” was significantly preferred over “supporting facilities, no recreation/play facilities,” which again was significantly preferred over “few facilities.” Such a preference for “facilities” was in the expected direction. As for the “woodlands” attribute, having a “mix of some trees and open areas” had a significantly higher preference than “wooded areas with dense trees,” which again had a significantly higher preference than “sparse trees.” The most

preferred woodland level of a “mix of some trees and open areas” – the semi-open, moderately-dense woodland structure and layout – was expected. Regarding “maintenance,” “well-maintained, neat-looking” had a significantly higher preference than “moderate-maintained, less neat-looking,” which again had a significantly higher preference than “low-maintenance, wild-looking.” As for “seasonal views,” “autumn colourful foliage” and “spring flowers” were the most preferred and utility values for the two levels were not significantly different from each other ($p=0.579$). “Winter branch-trunk viewing plants/conifer trees” was the least preferred level of “seasonal views.”

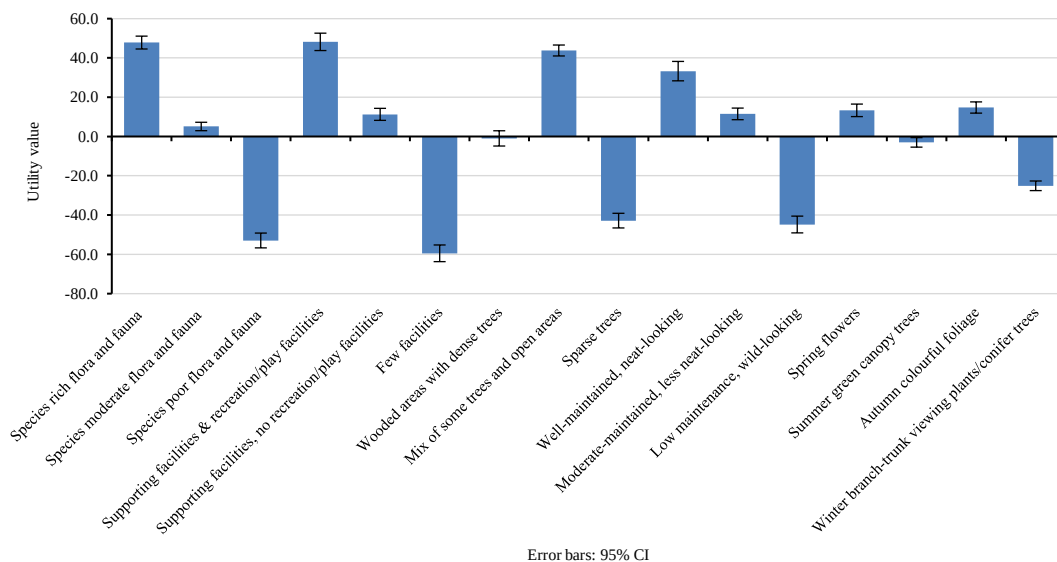


Figure 6.1 Utility value for each level of the five attributes within the whole public sample

The differences between utility values show the relative impact of the change between the levels (Aspinall, 2010), which provides useful information for practical design and management. For example, the difference between “species poor flora and fauna” and “species moderate flora and fauna” was significantly larger than that between “species moderate flora and fauna” and “species rich flora and fauna” ($p=0.000$). This suggests that providing a moderate level of species richness to a park with a currently low level of species

richness was seen as significantly more important than increasing species richness to a high level in a park that already has a moderate level of species richness. Thus, if designers and managers want to make a positive difference for urban parks, it is more important and relevant to go from poor to moderate than from moderate to rich in terms of flora and fauna species richness. Providing supporting facilities in a park currently with few facilities was seen as significantly more important than adding recreation/play facilities to a park that already had supporting facilities ($p=0.000$). Furthermore, improving maintenance to a moderate level in a park currently with low maintenance was seen as significantly more important than improving maintenance to a high level in a park that already had moderate maintenance ($p=0.000$).

The forementioned results were found within the whole public sample. For public respondents in each city, when considered separately (Figure 6.2), it was found that the pattern of utility values of the different levels of “species richness” was similar to that of the whole public sample, i.e. the public significantly preferred higher species richness of flora and fauna. Moreover, public respondents in both Hangzhou and Shanghai significantly preferred the level of higher sequence order of the attributes of “facilities” and “maintenance.” “Mix of some trees and open areas” was the most preferred “woodlands” level. For “seasonal views,” “autumn colourful foliage” and “spring flowers” were the most preferred. Detailed information about the statistical tests between utility values of levels within each city’s public sample can be found in Appendix C-1.

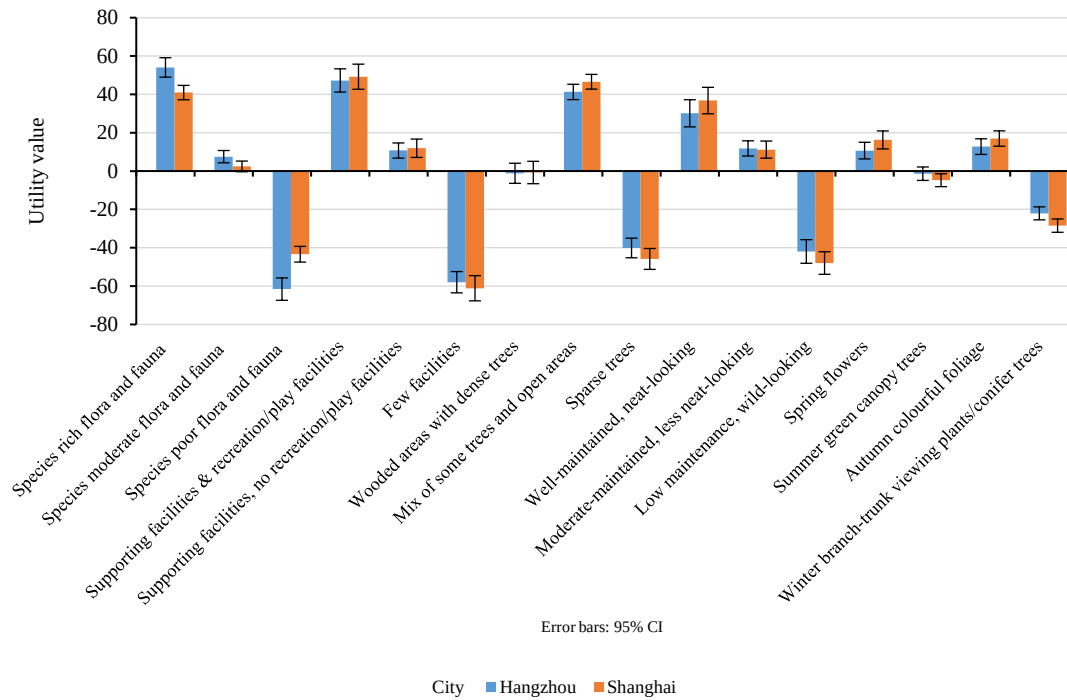


Figure 6.2 Utility value for each level of the five attributes in the Hangzhou and Shanghai public samples

6.2.2 Average importance of park attributes

In the whole public sample, “facilities” (25.0; 95% CI=23.9, 26.0) was the most important attribute (Figure 6.3), and it was assigned a significantly higher importance value than “species richness” (Wilcoxon: $Z=-4.656$, $p=0.000$). “Facilities” was followed by “species richness” (20.7; 95% CI=19.5, 22.0), “maintenance” (20.7; 95% CI=19.5, 21.8) and “woodlands” (20.2; 95% CI=19.3, 21.1), which did not differ significantly in importance from each other. “Seasonal views” (13.5; 95% CI=12.8, 14.2) was the least important attribute relative to other attributes.

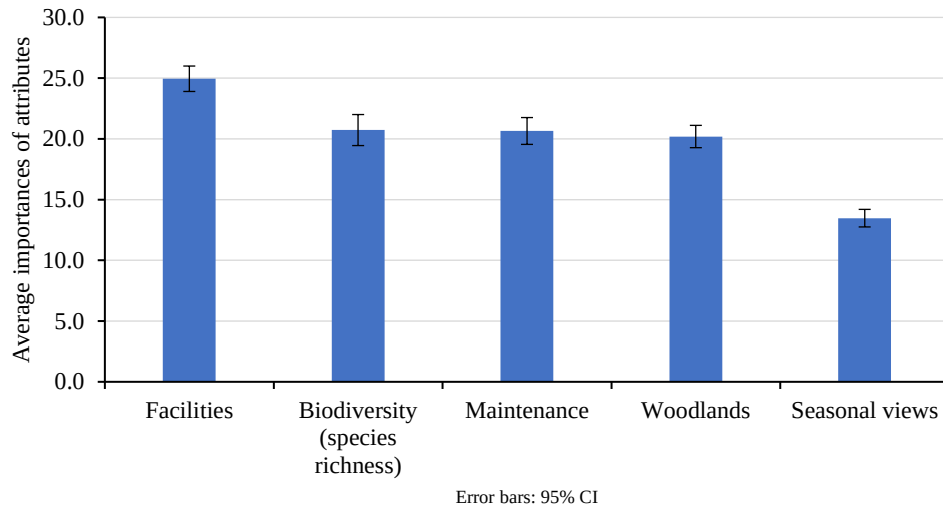


Figure 6.3 Average importance of park attributes in the whole public sample

Figure 6.4 reports the average importance of park attributes in each city's public sample. For the Hangzhou public, "facilities" (24.2; 95% CI=22.7, 25.6) and "species richness" (23.8; 95% CI=21.9, 25.8) were the most important attributes, which were not significantly different from each other in terms of importance values ($p=0.836$). These two attributes were followed by "maintenance" (20.0; 95% CI=18.4, 21.6) and "woodlands" (19.2; 95% CI=17.9, 20.5), which, again, did not differ significantly in importance from each other ($p=0.498$). "Seasonal views" was the least important attribute relative to other attributes (12.8; 95% CI=11.8, 13.8). Interestingly, in Hangzhou, "species richness" was perceived as significantly more important than "maintenance" ($p=0.016$), showing that compared with a well-maintained, neat-looking park with low species richness, Hangzhou public respondents were more likely to prefer a park with low maintenance and wild-looking appearance but with high species richness.

For Shanghai public respondents, the attribute "facilities" (25.8; 95% CI=24.3, 27.4) was the most important, having a significantly higher importance value ($p=0.000$) than the following "maintenance" and "woodlands." "Maintenance" (21.4; 95% CI=19.8, 22.9) and "woodlands" (21.3, 95% CI=20.0, 22.6) were not

significantly different from each other in terms of importance ($p=0.947$). The attribute “species richness” (17.3, 95% CI=15.9, 18.7) assumed the fourth ranking. At the bottom of the attributes was “seasonal views” (14.2, 95% CI=13.1, 15.2) with the lowest importance value. For details of the statistical tests about if there were significant differences in attribute importance, see Appendix C-2.

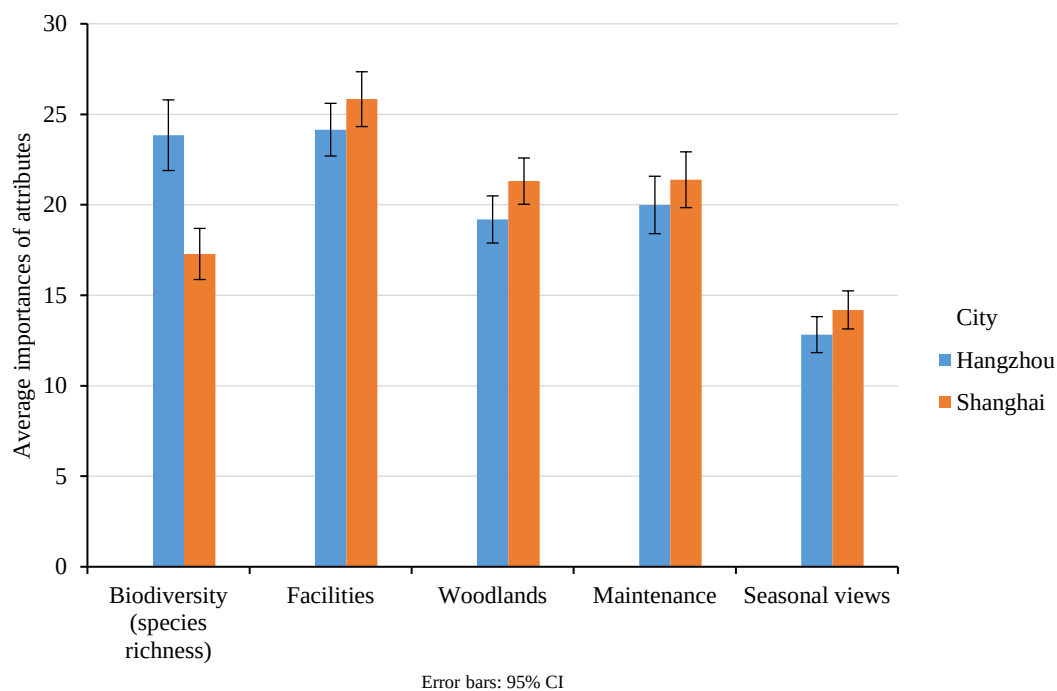


Figure 6.4 Average importance of park attributes in Hangzhou and Shanghai’s public samples

6.3 Correlations

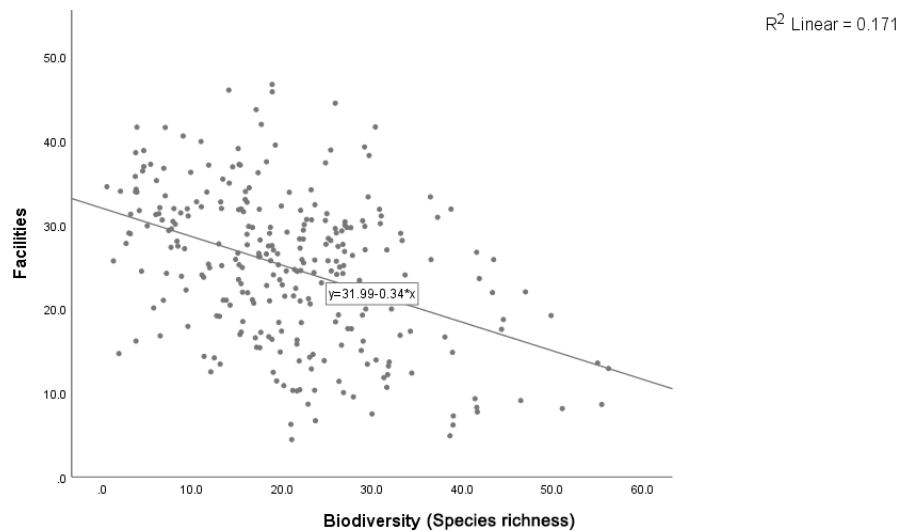
This research conducted a series of correlations between the importance values attached to species richness and the other four attributes. Moreover, correlations between utility values of different levels of species richness and the other four attributes were also tested. Non-parametric Spearman test was used if one or two of the variables did not show normal distributions, but when both variables showed normal distributions, Pearson test was used.

6.3.1 Public preferences for biodiversity and for facilities

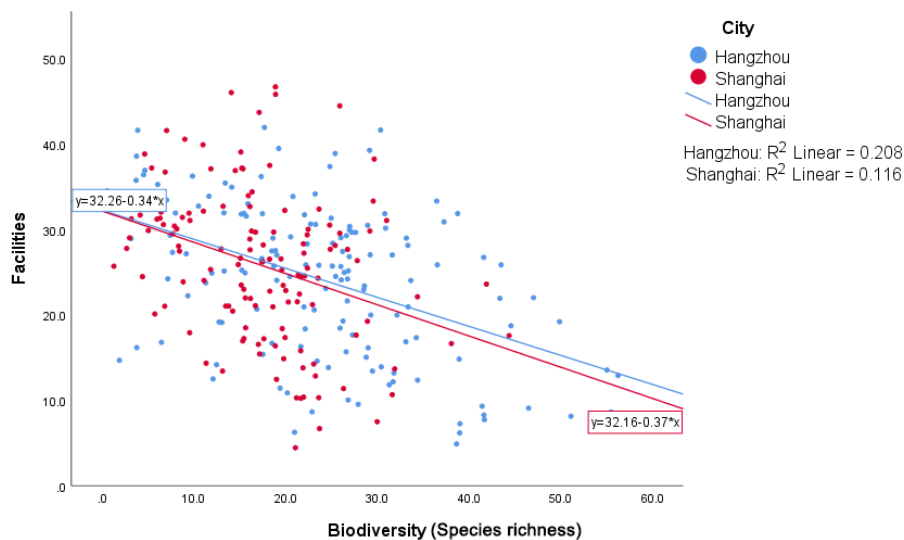
Significant negative correlations between the attributes of “species richness” and “facilities” were identified in the whole public sample and in each city’s public sample (Table 6.1a), indicating that those who attached a higher importance value to “species richness” were more likely to attach a lower importance value to “facilities.” Notably, correlations between the two attributes were quite strong in the whole public sample and in Hangzhou ($r_{\text{whole}}=-0.414$, $r_{\text{Hangzhou}}=-0.430$). Approximately 17.1% of the variability in “species richness” resulted from the variability in “facilities” in the whole public sample, and in Hangzhou, this percentage rose to 20.8% (Figure 6.5).

Table 6.1 Correlations between (a) attributes of “species richness” and “facilities,” (b) levels of attributes “species richness” and “facilities” (* $p \leq 0.05$, ** $p \leq 0.01$, *** $p \leq 0.001$)

(a) Attributes “species richness” and “facilities”			Facilities		
Species richness	Whole-PUB				
richness	HZ-PUB				
	SH-PUB				
(b) Levels of “species richness” and “facilities”					
Species rich	Whole-PUB		Supporting facilities & recreation/play	Supporting facilities, no recreation/play	Few facilities
			facilities	facilities	
flora and fauna	HZ-PUB				
	SH-PUB				
Species moderate	Whole-PUB				
flora and fauna	HZ-PUB				
	SH-PUB				
Species poor	Whole-PUB				
flora and fauna	HZ-PUB				
	SH-PUB				



(a) Whole public sample



(b) Hangzhou and Shanghai public samples

Figure 6.5 Correlations between the attributes “species richness” and “facilities” in the whole public sample (a) and in each city’s public sample (b).

Residents in the whole public sample and in Hangzhou who exhibited a higher preference for “species rich flora and fauna” were less likely to prefer “supporting facilities & recreation/play facilities” since significant moderate negative correlations between the two levels were identified ($r_{s\text{-}whole} = -0.258$, $r_{s\text{-}Hangzhou} = -0.326$). Respondents in the whole public sample and in each city’s public sample who preferred “species rich flora and fauna” were more

likely to prefer “few facilities,” since there were significant moderate positive correlations between the two levels ($r_{s\text{-whole}}=0.308$, $r_{s\text{-Hangzhou}}=0.315$, $r_{s\text{-Shanghai}}=0.300$) (Table 6.1b).

In the whole public sample and in each city, there was a significant moderate positive correlation between “species moderate flora and fauna” and “supporting facilities, no recreation/play facilities” ($r_{\text{whole}}=0.264$, $r_{\text{Hangzhou}}=0.255$, $r_{\text{Shanghai}}=0.297$) (Table 6.1b). This showed that those who preferred “species moderate flora and fauna” were more likely to prefer “supporting facilities, no recreation/play facilities.”

Moreover, there were significant moderate-strong positive correlations between “species poor flora and fauna” and “supporting facilities & recreation/play facilities” ($r_{s\text{-whole}}=0.354$, $r_{s\text{-Hangzhou}}=0.413$, $r_{s\text{-Shanghai}}=0.315$) (Table 6.1b), indicating that those who preferred “species poor flora and fauna” would have a stronger preference for “supporting facilities & recreation/play facilities.”

6.3.2 Public preferences for biodiversity and for woodlands

There were significant negative correlations between the attributes “species richness” and “woodlands” in the whole public sample and in each city’s public sample (Table 6.2a). Such correlation was moderate in Shanghai ($r_s=-0.251$). This implied that the higher importance values assigned to “species richness” were accompanied by lower importance values assigned to “woodlands,” particularly in Shanghai.

Table 6.2 Correlations between (a) attributes of “species richness” and “woodlands” and (b) levels of attributes “species richness” and “woodlands” (*p<=0.05, **p<=0.01, ***p<=0.001)

(a) Attributes “species richness” and “woodlands”				
		Woodlands		
Species richness	Whole-PUB		-0.240***	
	HZ-PUB		-0.202*	
	SH-PUB		-0.251**	
(b) Levels of “species richness” and “woodlands”				
		Wooded areas with dense trees	Mix of some trees and open areas	Sparse trees
Species rich flora and fauna	Whole-PUB	0.184**	-0.236***	-0.012
	HZ-PUB	0.188*	-0.209*	0.001
	SH-PUB	0.223**	-0.206*	-0.032
Species moderate flora and fauna	Whole-PUB	-0.101	-0.082	0.167**
	HZ-PUB	-0.084	-0.029	0.108
	SH-PUB	-0.125	-0.124	0.157
Species poor flora and fauna	Whole-PUB	-0.104	0.243***	-0.074
	HZ-PUB	-0.109	0.198*	-0.043
	SH-PUB	-0.119	0.273***	-0.108

This research found significant correlations between “species rich flora and fauna” and “wooded areas with dense trees” as well as “mix of some trees and open areas” in the whole public sample and in each city. However, such correlations were quite weak with their absolute values of correlation coefficients less than 0.25 (Table 6.2b). In Shanghai, there was a significant moderate positive correlation between “species poor flora and fauna” and “mix of some trees and open areas” (r=0.273).

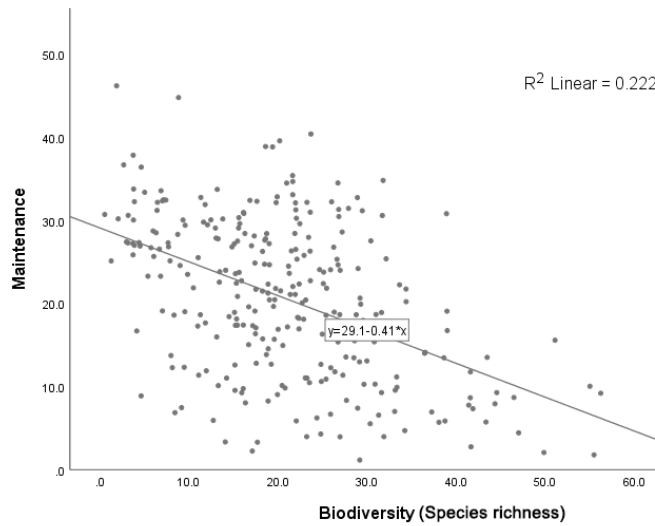
6.3.3 Public preferences for biodiversity and for maintenance

In the whole public sample and in each city’s public sample, the importance values attached to “species richness” were significantly negatively correlated with the importance values of “maintenance,” showing that those who strongly valued species richness were less likely to value maintenance (Table 6.3a).

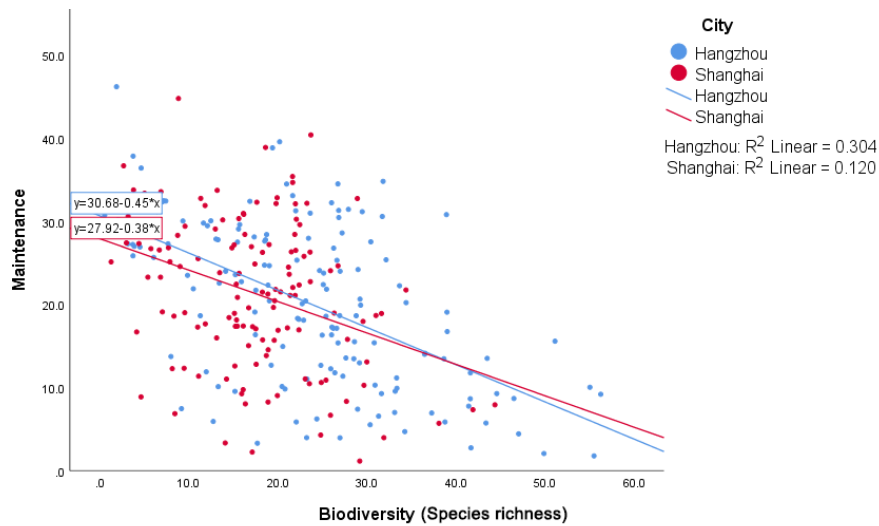
Moreover, these significant correlations were moderate to strong ($r_{\text{whole}}=-0.428$, $r_{\text{Hangzhou}}=-0.514$, $r_{\text{Shanghai}}=-0.347$). Notably, in the whole public sample, 22.2% of the variability in the importance values of “species richness” was shared by the importance values of “maintenance,” and in the Hangzhou public sample, this percentage rose to approximately 30.4% (Figure 6.6).

Table 6.3 Correlations between (a) attributes of “species richness” and “maintenance” and (b) levels of attributes “species richness” and “maintenance” (* $p \leq 0.05$, ** $p \leq 0.01$, *** $p \leq 0.001$)

(a) Attributes “species richness” and “maintenance”				
		Maintenance		
Species richness	Whole-PUB	-0.428***		
	HZ-PUB	-0.514***		
	SH-PUB	-0.347***		
(b) Levels of “species richness” and “maintenance”				
		Well-maintained, neat-looking	Moderate- maintained, neat-looking	Low-maintenance, less wild-looking
Species rich flora and fauna	Whole-PUB	-0.229***	-0.261***	0.422***
	HZ-PUB	-0.308***	-0.220**	0.434***
	SH-PUB	-0.094	-0.325***	0.378***
Species moderate flora and fauna	Whole-PUB	-0.121*	0.295***	-0.073
	HZ-PUB	-0.184*	0.375***	-0.024
	SH-PUB	-0.007	0.204*	-0.154
Species poor flora and fauna	Whole-PUB	0.280***	0.054	-0.331***
	HZ-PUB	0.380***	-0.028	-0.362***
	SH-PUB	0.124	0.159	-0.271**



(a) Whole public sample



(b) Hangzhou and Shanghai public samples

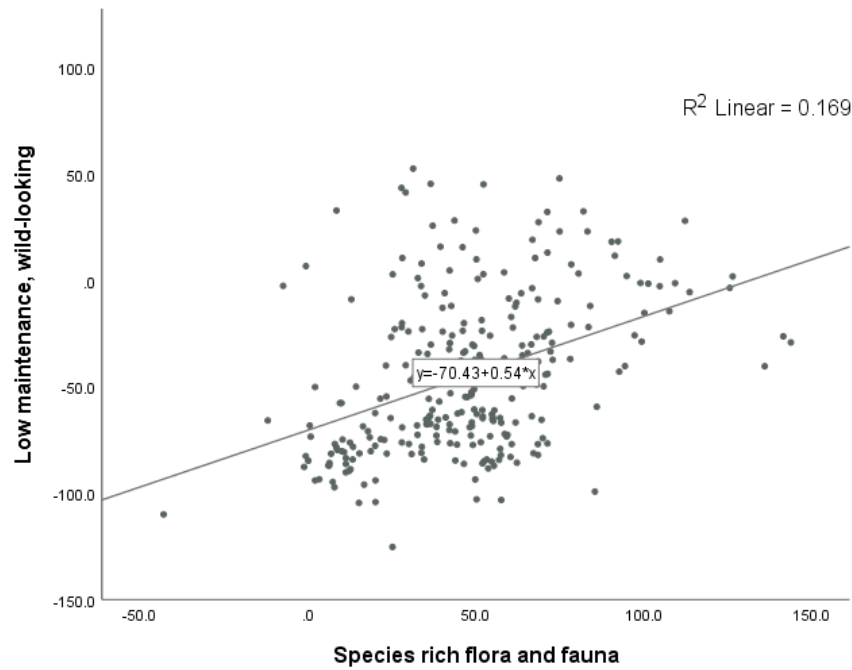
Figure 6.6 Correlations between the attributes “species richness” and “maintenance” in the whole public sample (a) and in each city’s public sample (b)

Significant negative correlations between “species rich flora and fauna” and “well-maintained, neat-looking” were found in the whole public sample and in Hangzhou public sample, but not in the Shanghai public sample (Table 6.3b). Moreover, in Hangzhou, such correlation was moderate ($r_s = -0.308$), suggesting Hangzhou public respondents who preferred “species rich flora and fauna” would have a weaker preference for “well-maintained, neat-looking.” Moreover, there were significant negative correlations between “species rich flora and

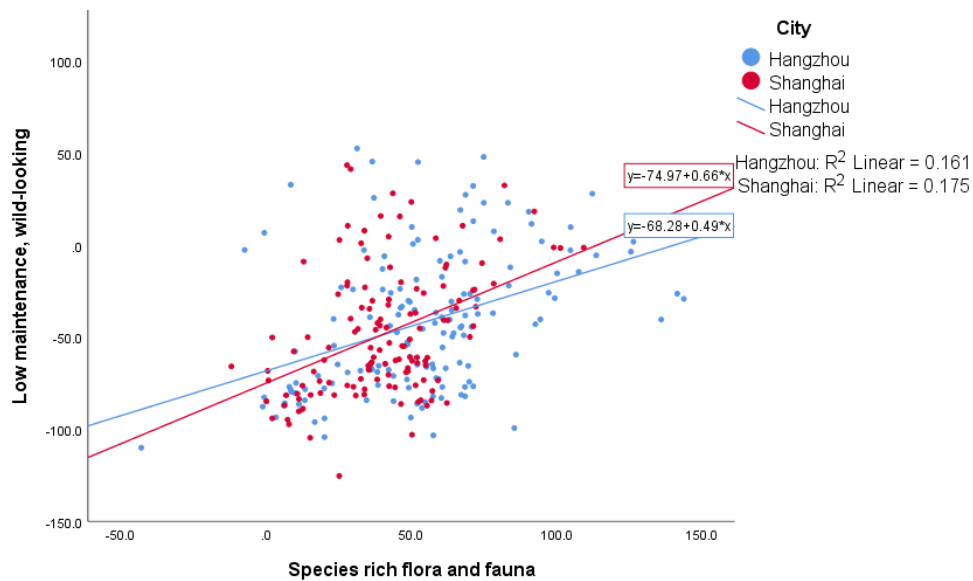
fauna” and “moderate-maintained, less neat-looking” in the three sample types (Table 6.3b), especially in Shanghai ($r_{\text{Shanghai}}=-0.325$) and in the whole public sample ($r_{\text{whole}}=-0.261$).

Interestingly, respondents who preferred “species rich flora and fauna” valued “low-maintenance, wild-looking” at the same time since there were significant moderately strong positive correlations between the two ($r_{\text{whole}}=0.422$, $r_{\text{Hangzhou}}=0.434$, $r_{\text{Shanghai}}=0.378$) (Table 6.3b). Notably, approximately 16% to 17% of the variability in the level “species rich flora and fauna” was shared by the variability in the level “low-maintenance, wild-looking” ($R^2_{\text{whole}}=16.9\%$, $R^2_{\text{Hangzhou}}=16.1\%$, $R^2_{\text{Shanghai}}=17.5\%$) (Figure 6.7).

The data also shows there were significant positive correlations between “species moderate flora and fauna” and “moderate-maintained, less neat-looking,” especially in Hangzhou and in the whole public sample where the correlations were moderate ($r_{\text{whole}}=0.295$, $r_{\text{Hangzhou}}=0.375$) (Table 6.3b). Meanwhile, significant moderate positive correlations between “species poor flora and fauna” and “well-maintained, neat-looking” were identified in the whole public sample ($r=0.280$) and in Hangzhou ($r=0.380$). Additionally, there were significant moderate negative correlations between “species poor flora and fauna” and “low-maintenance, wild-looking” in the whole public sample and in each city ($r_{\text{whole}}=-0.331$, $r_{\text{Hangzhou}}=-0.362$, $r_{\text{Shanghai}}=-0.271$) (Table 6.3b).



(a) Whole public sample



(b) Hangzhou and Shanghai public samples

Figure 6.7 Correlations between levels "species rich flora and fauna" and "low-maintenance, wild-looking" in the whole public sample (a) and in each city's public sample (b)

There were no significant correlations between importance values of attributes of "species richness" and "seasonal views" in both Hangzhou and Shanghai (both $p > 0.05$). Additionally, correlations between most levels of "species

richness” and “seasonal views” were quite weak (see Appendix C-3).

6.4 Preferences between wild and traditional parks

6.4.1 Share of preference

Different attribute levels were used to characterise and create typical Chinese wild and traditional park scenarios in Lighthouse Studio to represent the two park styles. According to the main characteristics of Chinese wild and traditional parks (e.g. Zhang and Zhang, 2002; Deng, 2003; Li *et al.*, 2019b; Wang *et al.*, 2021) (see sections 2.4.2 and 2.4.5), the wild park scenario was created using the levels “species rich flora and fauna,” “supporting facilities, no recreation/play facilities,” “wooded areas with dense trees,” “low-maintenance, wild-looking” and the four levels of the attribute “seasonal views.” The traditional park scenario was created using “species poor flora and fauna,” “supporting facilities & recreation/play facilities,” “mix of some trees and open areas,” “well-maintained, neat-looking” and the four levels of the attribute “seasonal views.”. These wild and traditional park scenarios are typical in China.

In the whole public sample, the traditional park scenario captured a share of preference at 69.2% (95% CI=64.6%, 73.9%), and the wild park scenario received a preference share at 30.8% (95% CI=26.1%, 35.4%). The traditional park scenario was significantly preferred over the wild one (Wilcoxon: $Z=-7.394$, $p=0.000$).

When considering each city separately, it was found that in Hangzhou, the traditional park scenario captured a preference share at 62.1% and the wild one received a preference share at 37.9%. In Shanghai, the traditional park scenario captured 77.1% of preference, and the wild park scenario received

22.9% of preference (Figure 6.8). The traditional park scenario was significantly preferred over the wild one among both Hangzhou (Wilcoxon: $Z=-3.510$, $p=0.000$) and Shanghai public respondents (Wilcoxon: $Z=-6.905$, $p=0.000$).

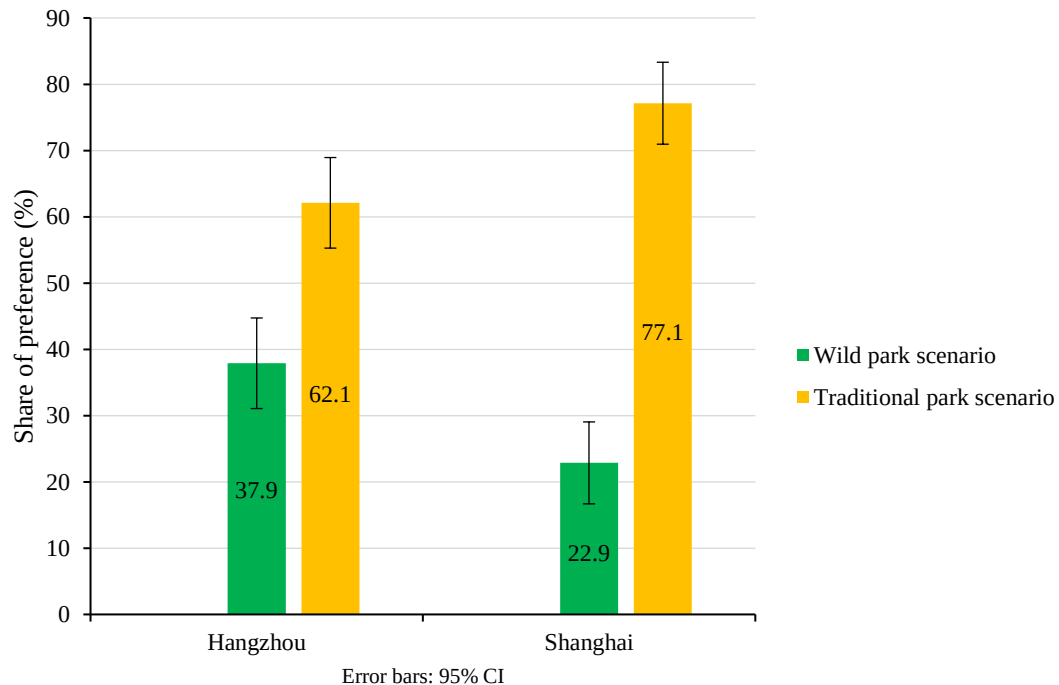


Figure 6.8 Share of preference between wild and traditional park scenarios among Hangzhou and Shanghai public respondents

Moreover, when extending the analysis of share of preference to all the possible park scenarios, it was found that the scenario with “species rich flora and fauna,” “supporting facilities & recreation/play facilities,” “mix of some trees and open areas,” “well-maintained, neat-looking” and “autumn colourful foliage” received the highest preference share.

6.4.2 Sensitivity analysis for the wild park scenario

Sensitivity analysis (Aspinall, 2010) was conducted to explore what changes of the wild park scenario might be effective in increasing its preferences. The information recorded in the wild park scenario in the Choice Simulator section in Lighthouse Studio (Table 6.4) was used as a reference/baseline to examine

the impacts of different changes.

Table 6.4 The information recorded in the wild park scenario in the Choice Simulator section in Lighthouse Studio: a reference/baseline

Wild parks	
Biodiversity	Species rich flora and fauna
Facilities	Supporting facilities, no recreation/play facilities
Woodlands	Wooded areas with dense trees
Maintenance	Low maintenance, wild-looking
Seasonal views	Spring flowers; Summer green canopy trees; Autumn colourful foliage; Winter branch-trunk viewing plants/conifer trees

Sensitivity analysis analysed the impacts on the share of preference of the wild park scenario by focusing on changes of the baseline levels within four attributes, i.e. “species richness,” “facilities,” “woodlands” and “maintenance.”

1. Changing species richness levels: “species rich flora and fauna” was changed to “species moderate flora and fauna” and “species poor flora and fauna.”
2. Changing facility levels: “supporting facilities, no recreation/play facilities” was changed to “supporting facilities & recreation/play facilities” and “few facilities.”
3. Changing woodlands levels: “wooded areas with dense trees” was changed to “mix of some trees and open areas” and “sparse trees.”
4. Changing maintenance levels: “low-maintenance, wild-looking” was changed to “moderate-maintained, neat-looking” and “well-maintained, neat-looking.”

Changing the baseline “species richness” level in the wild park scenario (baseline: “species rich flora and fauna”) to “species moderate flora and fauna” and “species poor flora and fauna” would significantly decrease its share of preference in the whole public sample and in each city’s public sample (Figures 6.9, 6.10 and 6.11) (both $ps \leq 0.001$, Appendix C-4). Similarly, in these three

samples, changing the baseline “facility” level (baseline: “supporting facilities, no recreation/play facilities”) to “few facilities” and changing the baseline “woodlands” level (baseline: “wooded areas with dense trees”) to “sparse trees” would significantly decrease the share of preference for the wild park scenario (Figures 6.9, 6.10 and 6.11) (both $ps \leq 0.001$, Appendix C-4).

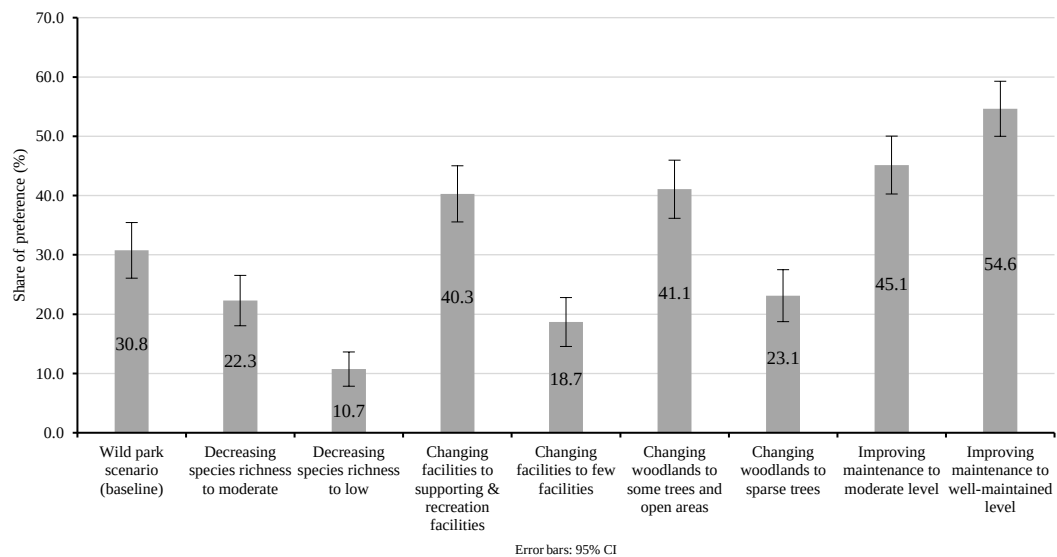


Figure 6.9 Share of preference for the baseline wild park scenario and the changed scenarios in the whole public sample

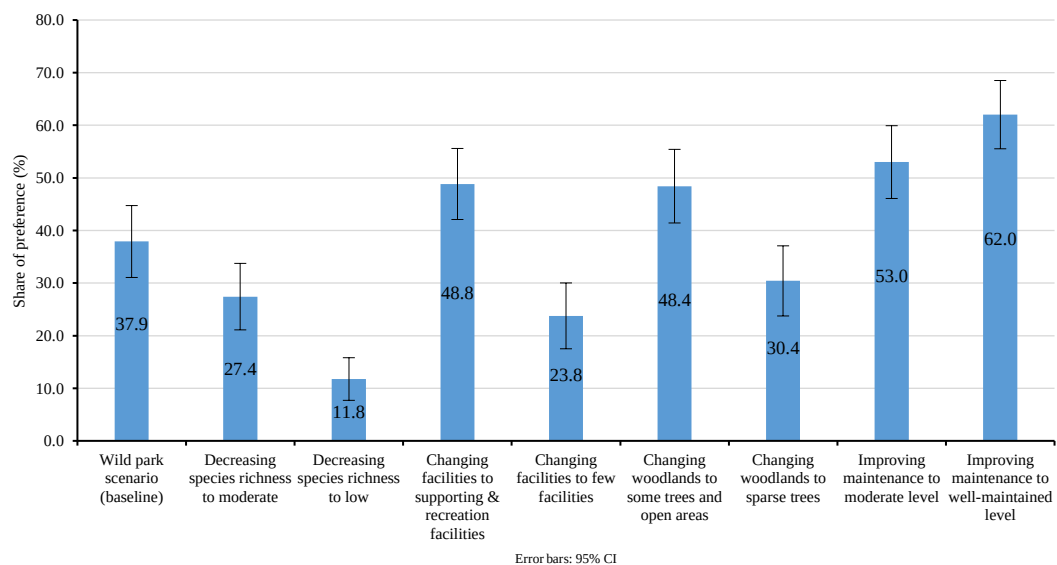


Figure 6.10 Share of preference for the baseline wild park scenario and the changed scenarios in the Hangzhou public sample

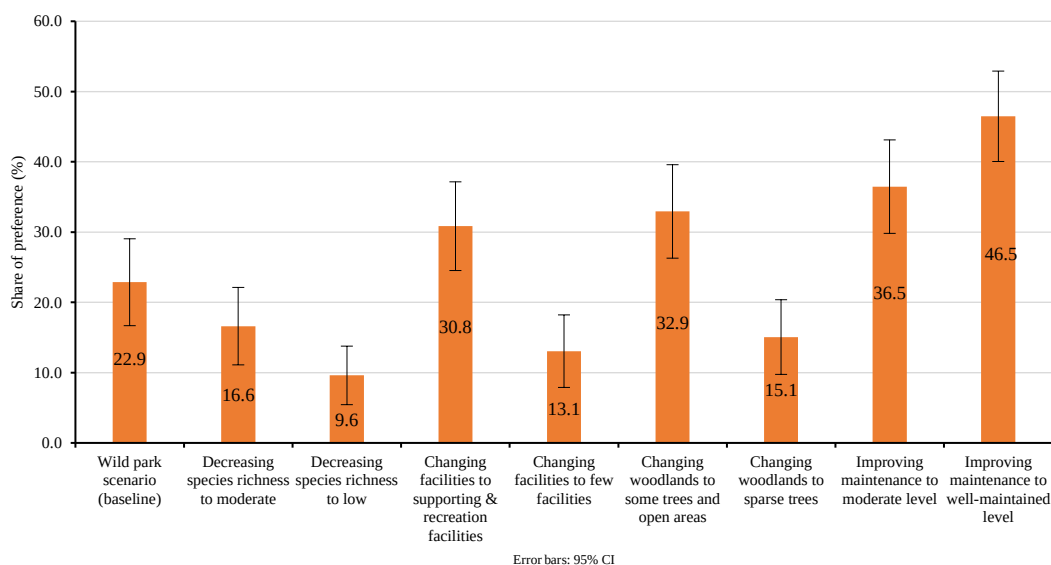


Figure 6.11 Share of preference for the baseline wild park scenario and the changed scenarios in the Shanghai public sample

In contrast, changing the baseline “facility” level to “supporting facilities & recreation/play facilities,” changing the baseline “woodlands” level to “mix of some trees and open areas,” and changing the baseline “maintenance” level to “moderate-maintained, less neat-looking” and “well-maintained, neat-looking” would significantly increase share of preference for the wild park scenario (Figures 6.9, 6.10 and 6.11) (all $p \leq 0.001$, Appendix C-4). Particularly when the baseline “maintenance” level was changed to “well-maintained, neat-looking,” the preference share for the changed scenario was about 1.5 times that of the original wild park scenario in Hangzhou (from 37.9% to 62.0%), about twice that of the original one in Shanghai (from 22.9% to 46.5%) and about 1.7 times that of the original one in the whole public sample (from 30.8% to 54.6%). Among all these changes, improving “maintenance” level to “well-maintained, neat-looking” would bring the greatest positive change in terms of the improvement of share of preference for the wild park scenario.

6.5 Preferences within different groups of the

respondents

Analysis of statistical differences between different groups focused on variables of attribute importance and the share of preference between wild and traditional park scenarios. Factors incorporated in the statistical tests were city of residence, gender, age, education, childhood living environment (rural or urban), residential context (city core or urban periphery) and interest/knowledge of nature/park/ecology in the public sample. An analysis of the preferences between the public and ecology/landscape professionals was also conducted.

Depending on the normal distribution of the data, Mann–Whitney U and independent samples t-tests were used for testing differences between two independent groups (Field, 2009), e.g. city of residence, gender, childhood living environment, residential context, have interest/knowledge of nature/park/ecology or not, professionals or not; and Kruskal Wallis and ANOVA tests were used for testing differences between more than two independent groups (Field, 2009), such as age and education. Non-parametric Mann–Whitney U or Kruskal Wallis tests were used when one variable did not show a normal distribution. ANOVA and parametric independent samples t-tests were used when all variables showed normal distributions.

6.5.1 City of residence

Attribute importance

When comparing attribute importance between cities, it was found that the factor “city of residence” - Hangzhou/Shanghai - presented non-significant differences in all attributes, except for “species richness” (Table 6.5). Specifically, Hangzhou public respondents significantly valued “species richness” compared to their Shanghai peers (also see Figure 6.4).

Table 6.5 Testing if there were significant differences between Hangzhou and Shanghai regarding each attribute importance (** $p \leq 0.001$)

	Species richness	Facilities	Woodlands	Maintenance	Seasonal views
Test	independent samples-t	Mann Whitney	Mann Whitney	Mann Whitney	Mann Whitney
Results	$t=5.384$, $p=0.000^{***}$	$Z=-1.287$, $p=0.198$	$Z=-1.844$, $p=0.065$	$Z=-1.176$, $p=0.240$	$Z=-1.891$, $p=0.059$

Share of preference

In both cities, the traditional park scenario was significantly preferred over the wild park scenario (Hangzhou: Wilcoxon: $Z=-3.510$, $p=0.000$; Shanghai: Wilcoxon: $Z=-6.905$, $p=0.000$) (Figure 6.8). However, Hangzhou residents significantly preferred the wild park scenario than Shanghai residents (Mann–Whitney U: $Z=-2.926$, $p=0.003$).

6.5.2 Gender

There were no significant differences in the average importance of any attribute between males and females in the whole public sample and in each city when considered separately (all $p_s > 0.05$, see Appendix C-5-1).

The share of preference shows the traditional park scenario was significantly preferred over the wild park scenario among both males and females in the three samples (all $p_s \leq 0.05$). Moreover, there were no significant differences in the preference share for the wild park scenario between males and females in the three samples (all $p_s > 0.05$, see Appendix C-5-1).

6.5.3 Age

Attribute importance

In the whole public sample, age presented a significant difference in the

average importance of the attribute “species richness” ($p=0.027$, Table 6.6). A post hoc Bonferroni test further revealed “species richness” was significantly more important to younger adults compared to the elderly (Adj. $p=0.022$, Figure 6.12). However, these findings were not found in each city. In Hangzhou, age presented significant differences in the average importance of the attribute “maintenance” ($p=0.049$, Table 6.6) and the post hoc Bonferroni test showed that “maintenance” was significantly more important to older participants compared to younger adults (Adj. $p=0.045$).

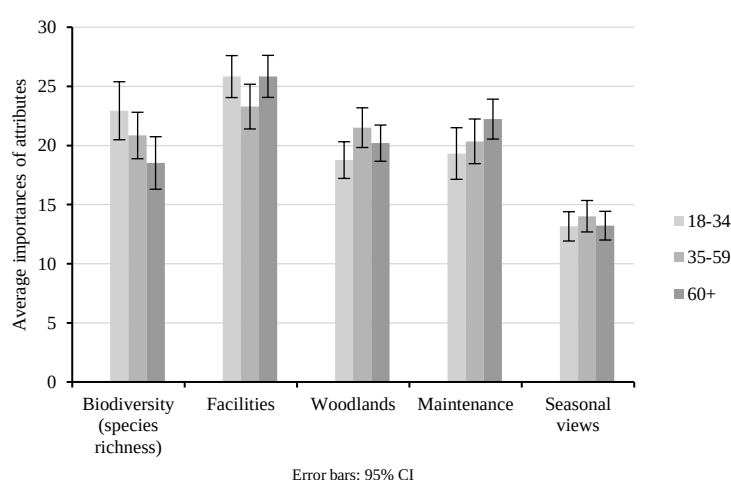


Figure 6.12 Average importance of park attributes between different age groups in the whole public sample

Table 6.6 Testing if there were significant differences between age groups regarding each attribute importance (* $p \leq 0.05$)

	Species richness	Facilities	Woodlands	Maintenance	Seasonal views
Whole public sample					
Test	Kruskal Wallis	ANOVA	Kruskal Wallis	Kruskal Wallis	Kruskal Wallis
Result	K-W H=7.221, p=0.027*	F=2.627, p=0.074	K-W H=5.317, p=0.070	K-W H=4.691, p=0.096	K-W H=0.656, p=0.720
Hangzhou public sample					
Test	ANOVA	ANOVA	Kruskal Wallis	ANOVA	Kruskal Wallis
Result	F=1.123, p=0.328	F=2.925, p=0.057	K-W H=4.980, p=0.083	F=3.086, p=0.049*	K-W H=4.200, p=0.122
Shanghai public sample					
Test	ANOVA	ANOVA	Kruskal Wallis	ANOVA	Kruskal Wallis
Result	F=0.906, p=0.407	F=1.000, p=0.905	K-W H=1.456, P=0.483	Welch=0.264, p=0.769	K-W H=1.051, p=0.591

Share of preference

The traditional park scenario was significantly preferred over the wild one among middle-aged and the elderly in the whole public sample and in each city's public sample (all $p \leq 0.05$). As for the younger adult group, while the data of the whole public sample and the Shanghai sample showed the traditional park scenario was significantly preferred over the wild one, the data of Hangzhou indicated the two park scenarios were preferred at a similar level as there were no significant differences in preference share between the two scenarios ($p=0.815$).

Moreover, in the whole public sample, age presented significant differences in the preference share for the wild park scenario (Table 6.7) and post hoc Bonferroni further shows the younger adult group significantly preferred the wild park scenario than the older group (Adj. $p=0.002$). While this is identified when the public sample is considered as a whole, it is the sub-sample of Hangzhou public respondents that contributed most to this finding when compared with Shanghai public respondents.

Table 6.7 Kruskal Wallis testing if there were significant differences regarding share of preference for the wild park scenario between three age groups (** $p \leq 0.01$)

Share of preference for the wild park scenario between age groups			
	Whole public sample	Hangzhou public sample	Shanghai public sample
K-W H	11.621	9.334	1.103
Sig. (2-tailed)	0.003**	0.009**	0.576

6.5.4 Education

Attribute importance

In the whole public sample, the perceived importance of the attribute “species richness” varied significantly according to education levels ($p=0.009$, Table 6.8) (Fig 6.13a). This is contributed by the Shanghai sub-sample when compared

with the sample from Hangzhou. Education presented significant differences in the importance of “species richness” in Shanghai ($p=0.033$, Table 6.8). The post hoc Bonferroni test found such significant difference was attributed to the difference between Shanghai respondents with high school or below education and those with postgraduate degree or higher education: the postgraduate degree or higher education group significantly valued “species richness” compared with the high school or below education group (Adj. $p=0.030$) (Figure 6.13b).

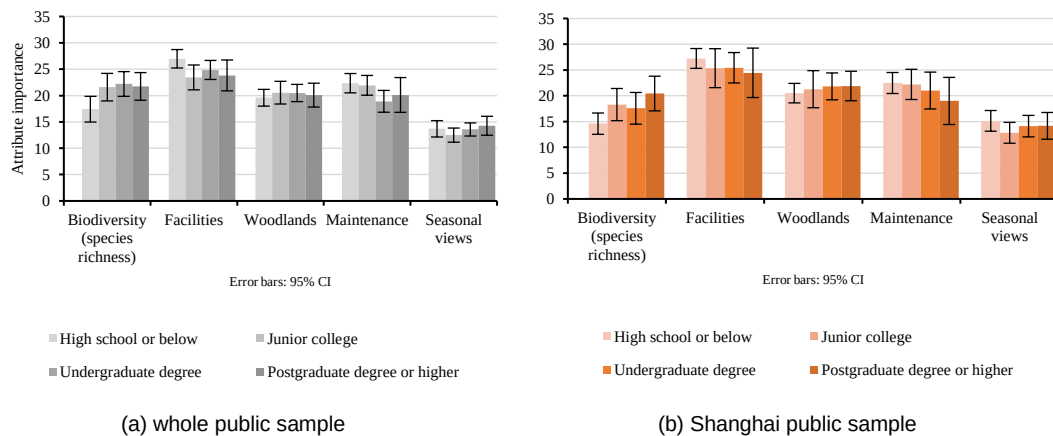


Figure 6.13 Average importance of park attributes between different education groups in (a) the whole public sample and (b) the Shanghai public sample

Table 6.8 Testing if there were significant differences between education groups regarding each attribute importance (* $p \leq 0.05$, ** $p \leq 0.01$)

	Species richness	Facilities	Woodlands	Maintenance	Seasonal views
Whole public sample					
Test	Kruskal Wallis	ANOVA	Kruskal Wallis	Kruskal Wallis	Kruskal Wallis
Result	K-W H=11.499, $p=0.009^{**}$	F=2.121, $p=0.098$	K-W H=0.888, $p=0.828$	K-W H=7.110, $p=0.068$	K-W H=2.069, $p=0.558$
Hangzhou public sample					
Test	ANOVA	ANOVA	ANOVA	Kruskal Wallis	Kruskal Wallis
Result	F=0.681, $p=0.565$	F=1.711, $p=0.167$	F=0.469, $p=0.704$	K-W H=5.979, $p=0.113$	K-W H=5.389, $p=0.145$
Shanghai public sample					
Test	ANOVA	ANOVA	Kruskal Wallis	ANOVA	ANOVA
Result	F=3.000, $p=0.033^{*}$	Welch=0.724, $p=0.541$	K-W H=1.433, $P=0.698$	Welch=0.763, $p=0.519$	F=0.805, $p=0.493$

Share of preference

In the whole public sample and in each city's public sample, the share of preference between the two park scenarios was not significantly different among those with a postgraduate degree or higher education attainments (all $p>0.05$) (Fig 6.14). Yet respondents with high school or below education significantly preferred the traditional park scenario over the wild one (Figure 6.14) (all $p=0.000$). In addition, in the whole public sample and in Shanghai public sample, those with junior college or undergraduate degree education preferred the traditional park scenario significantly more than the wild park scenario (all $p\leq 0.05$). However, in Hangzhou, the junior college and undergraduate degree groups preferred the two park scenarios at a similar level (both $p>0.05$).

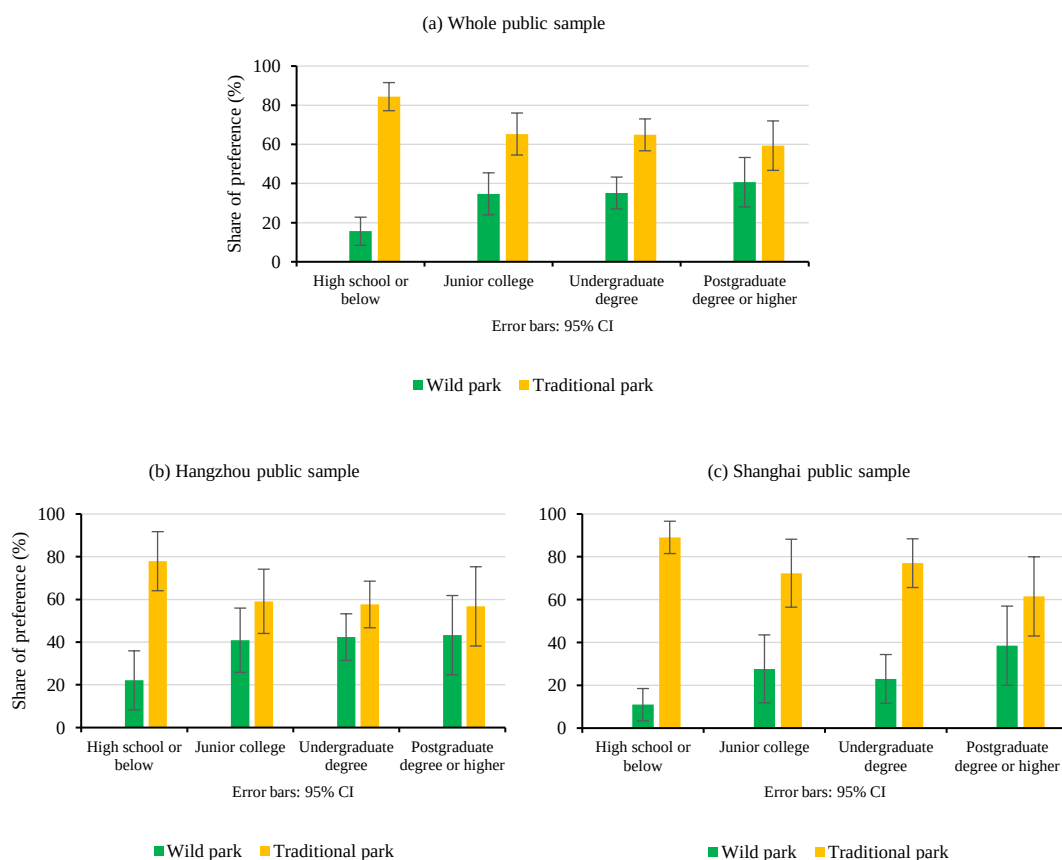


Figure 6.14 Share of preference for wild and traditional park scenarios by education groups

The share of preference for the wild park scenario differed significantly across education groups in the whole public sample and in Hangzhou, but not in Shanghai (Table 6.9). Specifically, the post hoc Bonferroni test revealed, in Hangzhou, those with an undergraduate degree or junior college education significantly preferred the wild park style to those with high school or below education (Adj. p-high school or below vs junior college: 0.045; Adj. p-high school or below vs undergraduate degree: 0.019).

Table 6.9 Kruskal Wallis testing if there were significant differences regarding share of preference for the wild park scenario between education groups (*p<=0.5, ***p<=0.001)

Share of preference for the wild park scenario between education groups			
	Whole public sample	Hangzhou public sample	Shanghai public sample
K-W H	20.582	10.786	7.533
Sig. (2-tailed)	0.000***	0.013*	0.057

6.5.5 Childhood living environment

Attribute importance

Data showed that there were no significant differences in the average importance of species richness between those who grew up in rural or urban areas in all three samples (all ps>0.05, see Appendix C-5-2). Hangzhou residents who grew up in rural areas attached a significantly higher average importance value to the attribute “seasonal views” (Mann–Whitney: Z=-3.577, p=0.000), which is also reflected in the whole public sample (Mann–Whitney: Z=-2.059, p=0.039).

Share of preference

Participants who grew up in both rural and urban areas significantly preferred the traditional over wild park scenarios in the three sample types (all ps<=0.05). Moreover, there were no significant differences between those who grew up in rural and urban areas regarding preference share for the wild park scenario in

all three sample types (all $p>0.05$).

6.5.6 Knowledge/interest in nature/park/ecology

Attribute importance

In the whole public sample and in the Shanghai public sample, those who had knowledge/interest in nature/park/ecology significantly valued the attribute “species richness” more than those without (Table 6.10, Figure 6.15). In these two samples, those without related ecological knowledge/interest gave significantly higher importance values to “facilities” and “maintenance.” However, these findings were not found in Hangzhou.

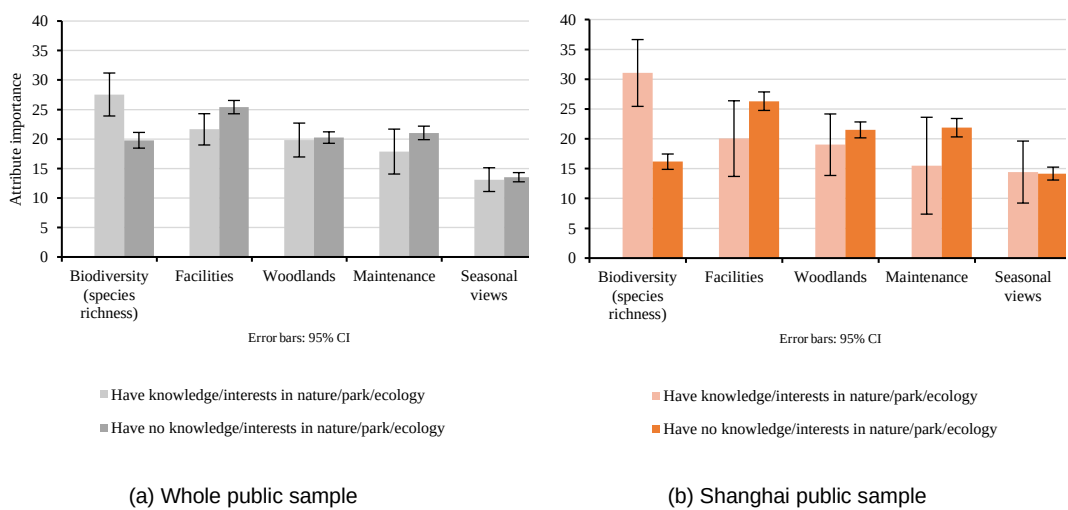


Figure 6.15 Average importance of park attributes according to knowledge/interest in nature/parks/ecology in (a) the whole public sample and (b) the Shanghai public sample

Table 6.10 Testing if there were significant differences of attributes' importance values according to groups with/without knowledge/interest in nature/parks/ecology (* $p \leq 0.05$, *** $p \leq 0.001$)

	Species richness	Facilities	Woodlands	Maintenance	Seasonal views
Whole public sample					
Test	independent samples-t	independent samples-t	independent samples-t	Mann Whitney	Mann Whitney
Result	T=4.012, p=0.000***	T=-2.332, p=0.020*	T=-0.291, p=0.771	Z=-2.054, p=0.040*	Z=-0.434, p=0.664
Hangzhou public sample					
Test	independent samples-t	Mann Whitney	independent samples-t	Mann Whitney	Mann Whitney
Result	T=1.005, p=0.316	Z=-1.226, p=0.220	T=0.657, p=0.512	Z=-0.797, p=0.426	Z=-0.147, p=0.883
Shanghai public sample					
Test	independent samples-t	independent samples-t	Mann Whitney	independent samples-t	Mann Whitney
Result	T=6.237, p=0.000***	T=-2.191, p=0.030*	Z=-0.896, p=0.370	T=-2.188, p=0.030*	Z=-0.094, p=0.925

Share of preference

In the whole public sample and in each city's public sample, those who had related ecological knowledge/interest appreciated both two park scenarios, as preferences between the two were not significantly different (both $p > 0.05$). By contrast, those who had no knowledge/interest significantly preferred the traditional over wild scenarios (both $p \leq 0.001$). Furthermore, as shown in Table 6.11 and Figure 6.16, in the whole public sample and in each city's public sample, respondents with related ecological knowledge/interest significantly preferred the wild park scenario than those without.

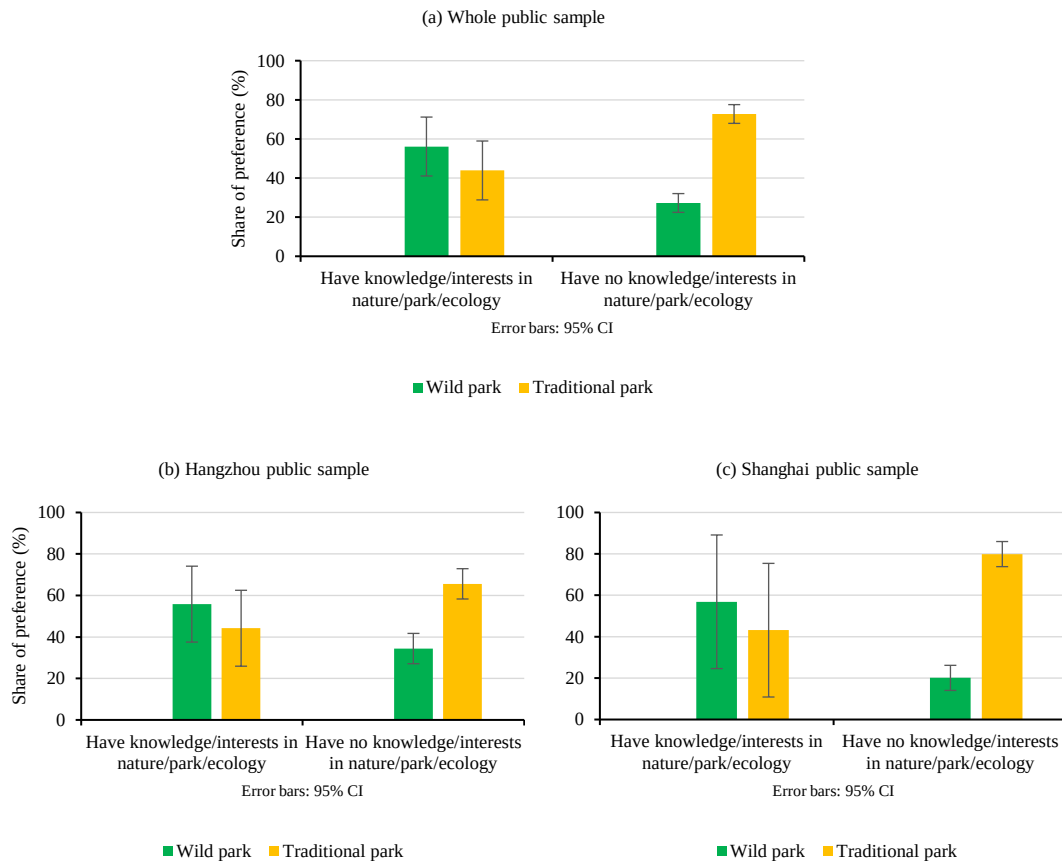


Figure 6.16 Share of preference for wild and traditional park scenarios by having knowledge/interests in nature/park/ecology or not

Table 6.11 Mann–Whitney U testing if there were significant differences regarding share of preference for the wild park scenario between those with knowledge/interests in nature/park/ecology and those without (Note: * $p \leq 0.05$, *** $p \leq 0.001$)

Share of preference for the wild park scenario between those with knowledge/interests in nature/park/ecology and those without			
	Whole public sample	Hangzhou public sample	Shanghai public sample
Z	-3.808	-2.132	-2.953
Sig. (2-tailed)	0.000***	0.033*	0.003***

6.5.7 Residential context

Average importance of attributes

Average importance values attached to the five park attributes had no significant variation between respondents who lived in the city core or urban

periphery in all the three sample types (all $p>0.5$, see Appendix C-5-3). This suggests that preferences for the five attributes did not differ significantly between groups with different residential contexts.

Share of preference between wild and traditional parks

The data of share of preference reported that in the three samples, respondents who lived in the city core significantly preferred the traditional park scenario over the wild one. However, for those who lived in the urban periphery, the data showed a slightly different picture. While in the whole public sample and in Shanghai's public sample, respondents who lived in the urban periphery preferred the traditional significantly over the wild, those who dwelled in the urban periphery in Hangzhou appreciated both ($p=0.199$). Moreover, the preference share for the wild park scenario did not differ significantly between those who dwelled in the city core and in the urban periphery (all $p>0.05$).

6.5.8 The public vs. ecology/landscape professionals

Attribute importance

The forementioned results are within the general public respondents. Given below are results from the comparison between the public and ecology/landscape professionals.

Figure 6.17 provided the average importance of the five attributes between the public versus professionals. It illustrated that the attribute "species richness" assumed the first ranking in terms of the importance among professionals regardless of the sample type. Moreover, paired samples t-tests revealed that professionals in the whole sample and in the Hangzhou sample valued "species richness" significantly higher than the second ranked "facilities" attribute (whole: $t=5.263$, $p=0.000$; Hangzhou: $t=2.052$, $p=0.047$). Professionals in the Shanghai

sample significantly valued “species richness” more than the second ranked attribute “woodlands” (paired samples-t: $t=5.026$, $p=0.000$).

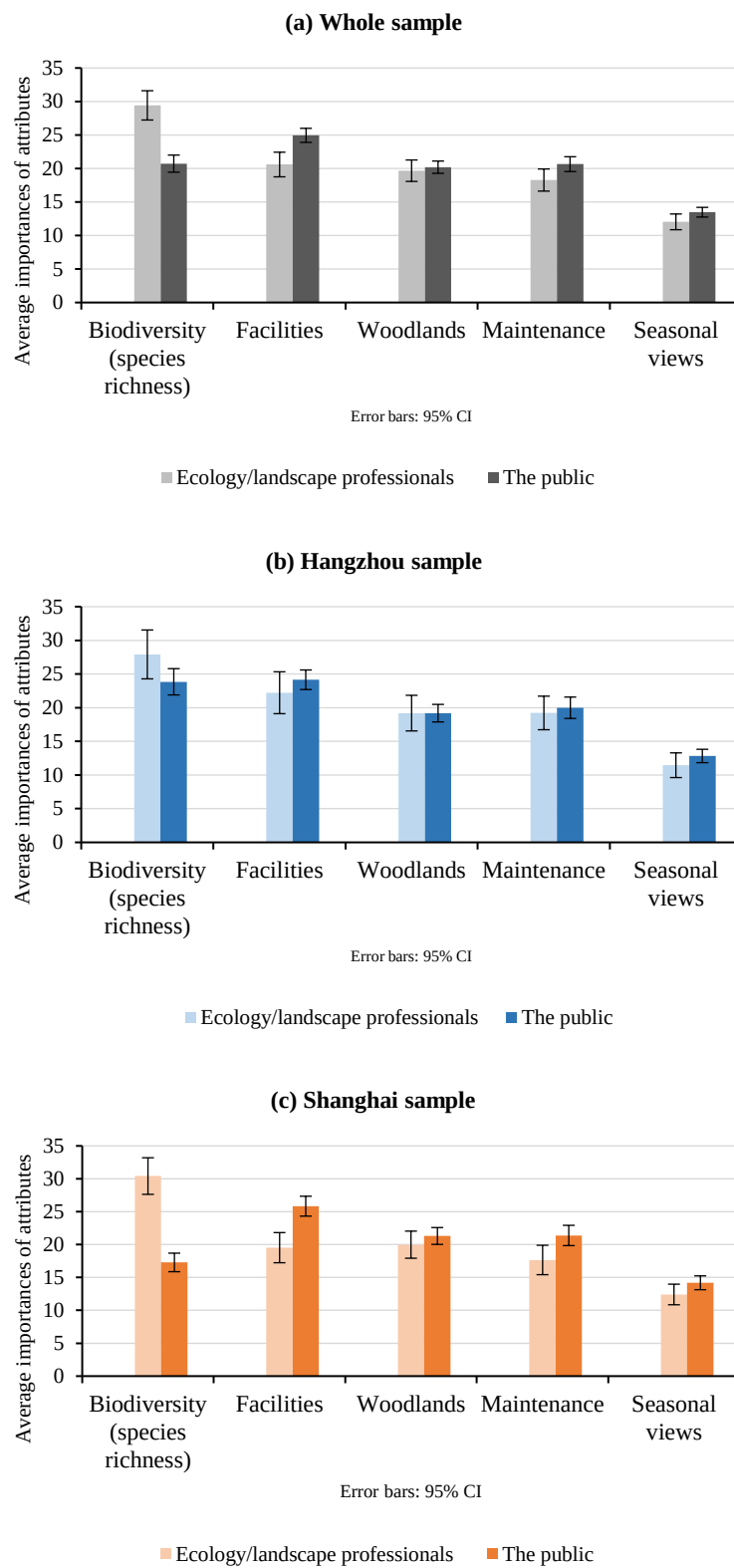


Figure 6.17 Average importance of attributes within the public and ecology/landscape professionals in (a) the total sample, (b) Hangzhou sample and (c) Shanghai sample

Table 6.12 presented statistical differences between the public and professionals regarding each attribute importance. In the whole sample and in the Shanghai sample, the factor of professional or not presented significant differences in all attributes except for the attribute “woodlands” where the two groups of respondents assigned a similar importance value to it. More specifically, the results of Table 6.12 and Figure 6.17 revealed that in the total sample and in Shanghai, the attribute “species richness” was significantly more important for professionals than for the public, but for the public, the attributes “facilities,” “maintenance” and “seasonal views” were significantly more important when compared with professionals. Nevertheless, there were no significant differences in the average importance of any attribute between public and professional groups in Hangzhou (all $p>0.05$, Table 6.12).

Table 6.12 Testing if there were significant differences regarding each attribute importance between ecology/landscape professionals versus the public (T-test: independent samples t-test, * $p\leq 0.05$, ** $p\leq 0.01$, *** $p\leq 0.001$)

	Species richness	Facilities	Woodlands	Maintenance	Seasonal views
The total sample					
Test	T test	T test	T test	Mann Whitney	Mann Whitney
Resul	t=6.866,	t=-4.164,	t=-0.573,	Z=-2.295,	Z=-2.440,
t	p=0.000***	p=0.000***	p=0.567	p=0.022*	p=0.015*
The Hangzhou sample					
Test	T test	Mann Whitney	T test	Mann Whitney	Mann Whitney
Resul	t=1.925,	Z=-1.318,	t=0.004,	Z=-0.550,	Z=-1.667,
t	p=0.056	p=0.188	p=0.997	p=0.582	p=0.095
The Shanghai sample					
Test	T test	T test	Mann Whitney	T test	Mann Whitney
Resul	T=8.403,	T=-4.599,	Z=-1.029,	T=-2.707,	Z=-2.053,
t	p=0.000***	p=0.000***	p=0.304	p=0.007**	p=0.040*

Share of preference

When examining the share of preference for wild and traditional park scenarios among professionals, it was found that the wild park scenario was significantly preferred over the traditional park scenario in the whole sample, plus in

Hangzhou and Shanghai when considered separately (Figure 6.18 and all $p \leq 0.05$). This contrasts with the general public's view that the traditional park scenario was significantly more preferable. Furthermore, as shown in Table 6.13, professionals significantly preferred the wild park scenario compared with the public in the whole sample and in each city sample.

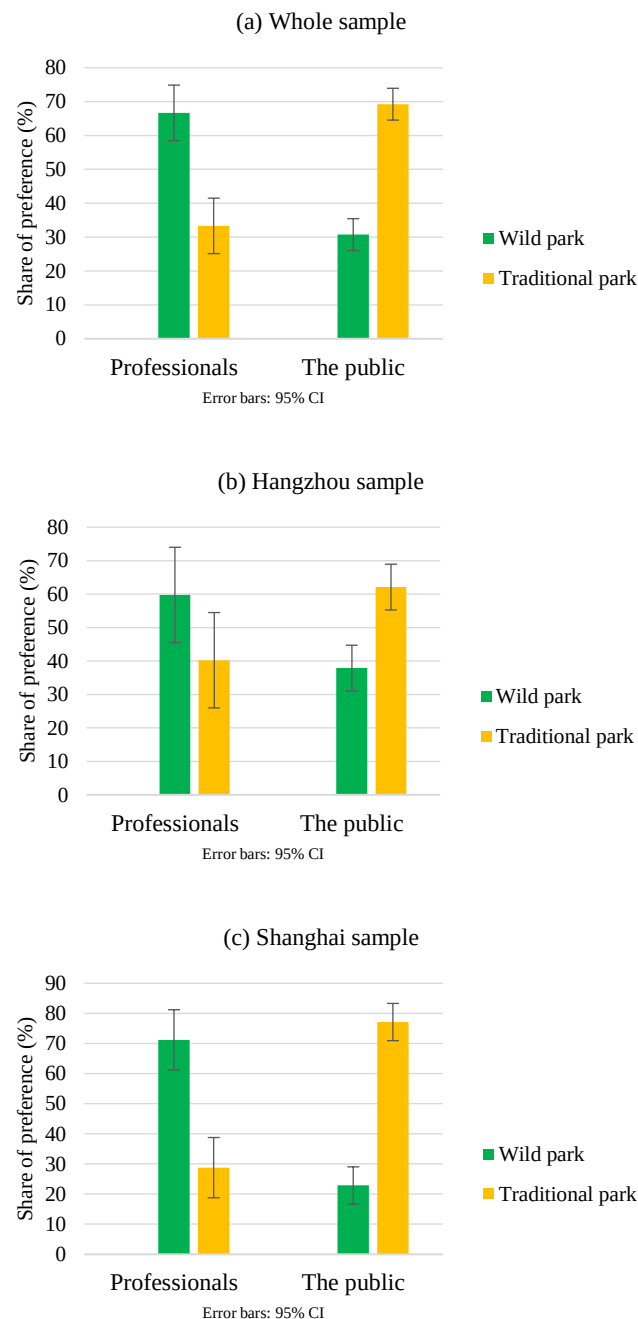


Figure 6.18 Share of preference for the wild and traditional park scenarios between the public versus ecology/landscape professionals in (a) the whole sample, (b) the Hangzhou sample and (c) the Shanghai sample

Table 6.13 Mann–Whitney U testing if there were significant differences regarding share of preference for the wild park scenario between the public and professionals (**p<=0.001)

Share of preference for the wild park scenario between the public and professionals			
	Whole sample	Hangzhou sample	Shanghai sample
Z	-7.157	-3.489	-6.730
Sig. (2-tailed)	0.000***	0.000***	0.000***

6.6 Regression

Statistical tests reveal that the perceived importance of the attribute “species richness” varied significantly between age, education, ecological-related knowledge/interest and city of residence groups in the whole public sample. The perceived importance of species richness was further tested in multiple regression for the data of the whole public sample. Specifically, a hierarchical multiple regression (HMR) was conducted (with two blocks and each block represented one step) with the factors of age, education, ecological-related knowledge/interest and city of residence, since significant differences of the perceived importance of species richness between these factors were found. In HMR, each factor was tested while controlling for other factors. Since the relative importance of species richness was non-significantly different across different groups in Hangzhou, multiple regression was not undertaken for the Hangzhou public sample. For the data sourced in the Shanghai public sample, the relative importance of species richness varied significantly between education and ecological-related knowledge/interest groups. Thus, a two-blocks HMR was also conducted for the Shanghai public sample. Variables of age, education, ecological-related knowledge/interest and city were all transformed as dummy variables, since they are all categorical variables. Assumptions of no multicollinearity (the VIF values were all below the critical value of 10), independent errors (Durbin–Watson statistic was between 1 and 3), normally distributed errors, etc., were checked.

In the whole public sample

The output of HMR testing the factor of city of residence in predicting the perceived importance of species richness while controlling for age, education and ecological-related knowledge/interest is shown in Table 6.14. Model 1 contained factors of age, education and ecological-related knowledge/interest and it only explained 8.4% of the perceived importance of species richness (model 1: $R^2=0.084$). However, when the factor of city of residence was added, the new model 2 explained 14.6% of the perceived importance of species richness (model 2: $R^2=0.146$). Moreover, the increase in R^2 from model 1 to model 2 was significant (Sig. F Change=0.000). Therefore, adding the factor of city of residence significantly improved the model for the prediction of the perceived importance value of species richness, and model 1 and model 2 both predicted species richness significantly well (ANOVA: p -model 1=0.001, p -model 2=0.000). Coefficients in Table 6.14 also showed that after controlling for age, education and ecological-related knowledge/interest, the importance of the attribute “species richness” was still significantly differently perceived between Hangzhou and Shanghai, indicating city of residence was a strong predictor for the variable of the perceived importance of species richness ($p=0.000$).

Table 6.14 HMR testing the factor of city of residence for predicting the perceived importance of the attribute “species richness” in the whole public sample, controlling for education, age and ecological-related knowledge/interest (HZ=Hangzhou, SH=Shanghai, HS=High school or below, JC=Junior college, UG=Undergraduate degree, PG=Postgraduate degree or higher, **p<=0.01, ***p<=0.001)

		Change Statistics			ANOVA	
		R Square				
Model		R Square	Change	F Change	Sig. F Change	
1		0.084	0.084	4.168	0.001***	
2		0.146	0.062	19.614	0.000***	
		Coefficients				
		Unstandardized Coefficients		Standardized Coefficients		
Model		B	Std. Error	Beta	t	Sig.
1	(Constant)	21.123	1.302		16.225	0.000
	No related knowledge vs. Have related knowledge	7.338	2.072	0.221	3.541	0.000***
	UG VS. HS	-3.233	1.932	-0.132	-1.673	0.095
	UG VS. JC	0.077	1.794	0.003	0.043	0.966
	UG VS. PG	-2.606	1.988	-0.088	-1.311	0.191
	Middle-aged vs. Younger adults	0.892	1.639	0.038	0.545	0.587
	Middle-aged vs. Older	-0.961	1.724	-0.042	-0.558	0.577
2	(Constant)	17.521	1.499		11.685	0.000
	No related knowledge vs. Have related knowledge	6.069	2.025	0.183	2.996	0.003**
	UG VS. HS	-3.028	1.870	-0.123	-1.619	0.107
	UG VS. JC	0.159	1.736	0.006	0.092	0.927
	UG VS. PG	-1.275	1.947	-.043	-0.655	0.513
	Middle-aged vs. Younger adults	0.996	1.586	0.043	0.628	0.530
	Middle -aged vs. Older	0.470	1.699	0.020	0.277	0.782
	SH VS. HZ	5.642	1.274	0.260	4.429	0.000***

Table 6.15 below showed the result of HMR testing for the factor of ecological related knowledge/interest in predicting the perceived importance value of species richness while controlling for education, age and city of residence. While factors of education, age and city of residence in model 1 accounted for

11.7% of the variation in the perceived importance of species richness (model 1: $R^2=0.117$), when the factor of related knowledge/interest was incorporated, model 2 explained 14.6% of the perceived importance of species richness (model 2: $R^2=0.146$). The change in R^2 from model 1 to model 2 was also significant (Sig. F Change=0.003). Thus, adding the factor of related knowledge/interest significantly improved the model for the prediction of the perceived importance of species richness. Both model 1 and model 2 predicted the perceived importance of species richness significantly well (ANOVA: p -model 1=0.000, p -model 2=0.000). Coefficients in Table 6.15 indicated ecological related knowledge/interest could significantly predict the perceived importance of species richness after controlling for education, age and city ($p=0.003$), and those who had related knowledge/interest significantly valued species richness.

HMR reported that age could not significantly predict the perceived importance of species richness while controlling for factors of ecological-related knowledge/interest, education and city of residence ($p>0.05$, Appendix C-6). Moreover, when testing the impact of education while controlling for age, ecological-related knowledge/interest and city of residence, it was found that education did not show significance in the regression models ($p>0.05$, Appendix C-6).

Table 6.15 HMR testing the factor of ecological-related knowledge/interest for predicting the perceived importance of the attribute “species richness” in the whole public sample controlling for education, age and city (HZ=Hangzhou, SH=Shanghai, HS=High school or below, JC=Junior college, UG=Undergraduate degree, PG=Postgraduate degree or higher, **p<=0.01, ***p<=0.001)

Change Statistics					ANOVA	
Model	R Square	R Square Change	F Change	Sig. F Change	F	Sig.
1	0.117	0.117	6.048	0.000***	6.048	0.000***
2	0.146	0.028	8.978	0.003**	6.618	0.000***
Coefficients						
Unstandardized Coefficients			Standardized Coefficients			
Model	B	Std. Error	Beta	t	Sig.	
1 (Constant)	17.475	1.521		11.488	0.000	
UG vs. HS	-3.181	1.897	-0.129	-1.677	0.095	
UG vs. JC	0.203	1.761	0.008	0.116	0.908	
UG vs. PG	0.175	1.913	0.006	0.091	0.927	
Middle-aged vs. Younger adults	1.799	1.586	0.077	1.135	0.257	
Middle-aged vs. Older	0.610	1.723	0.027	0.354	0.723	
SH vs. HZ	6.182	1.279	0.285	4.832	0.000***	
2 (Constant)	17.521	1.499		11.685	0.000	
UG vs. HS	-3.028	1.870	-0.123	-1.619	0.107	
UG vs. JC	0.159	1.736	0.006	0.092	0.927	
UG vs. PG	-1.275	1.947	-0.043	-0.655	0.513	
Middle-aged vs. Younger adults	0.996	1.586	0.043	0.628	0.530	
Middle-aged vs. Older	0.470	1.699	0.020	0.277	0.782	
SH vs. HZ	5.642	1.274	0.260	4.429	0.000***	
No related knowledge vs. Have related knowledge	6.069	2.025	0.183	2.996	0.003**	

In the Shanghai public sample

Regarding the Shanghai public sample, education in model 1 explained only 6.5% of the perceived importance of species richness (model 1: R square=0.065). Yet when the factor of related knowledge/interest was incorporated, the model explanation power increased to 26% (model 2: R square=0.260) and this increase was significant (Sig. F Change=0.000). Model

1 and model 2 predicted the importance of species richness significantly well (ANOVA: p-model 1=0.033, p-model 2=0.000). Coefficients in Table 6.16 indicated that after controlling for education, the importance of species richness was perceived significantly different between those with ecological-related knowledge/interest and those without (p=0.000) (Table 6.16).

Table 6.16 HMR testing the factor of ecological-related knowledge/interest for predicting the perceived importance of the attribute “species richness” in the Shanghai public sample controlling for education (HS=High school or below, JC=Junior college, UG=Undergraduate degree, PG=Postgraduate degree or higher, *p<=0.05, **p<=0.01, ***p<=0.001)

		Change Statistics			ANOVA		
		R Square					
Model		R Square	Change	F Change	Sig. F Change	F	Sig.
1		0.065	0.065	3.000	0.033*	3.000	0.033*
2		0.260	0.195	33.698	0.000***	11.244	0.000***
Coefficients							
		Unstandardized Coefficients		Standardized Coefficients			
Model		B	Std. Error	Beta	t	Sig.	
1	(Constant)	14.598	1.227		11.897	0.000	
	HS vs. JC	3.703	1.954	0.184	1.895	0.060	
	HS vs. UG	2.977	1.791	0.164	1.662	0.099	
	HS vs PG	5.849	2.050	0.274	2.853	0.005**	
2	(Constant)	14.273	1.097		13.006	0.000	
	HS vs. JC	3.031	1.749	0.151	1.733	0.086	
	HS vs. UG	2.199	1.606	0.121	1.370	0.173	
	HS vs PG	3.847	1.863	0.181	2.065	0.041*	
	No related knowledge vs. Have related knowledge	13.961	2.405	0.449	5.805	0.000***	

Table 6.17 showed the result of HMR testing of education in predicting the perceived importance of species richness in the Shanghai public sample while controlling for ecological-related knowledge/interest. It is found ecological-related knowledge/interest in model 1 had already explained only 22.9% of the perceived importance of species richness (model 1: R square=0.229). After

adding education, the model explanation power increased to 26% (model 2: R square=0.260), yet this increase was non-significant (Sig. F Change=0.152). Model 1 and model 2 predicted the perceived importance of species richness significantly well (ANOVA: p-model 1=0.000, p-model 2=0.000). Education was significant in model 2, and specifically species richness was perceived significantly different in terms of importance between those with high school or below education and those with postgraduate degree or higher education (p=0.041).

Table 6.17 HMR testing the factor of education for predicting the perceived importance of the attribute “species richness” in the Shanghai public sample controlling for ecological-related knowledge/interest (HS=High school or below, JC=Junior college, UG=Undergraduate degree, PG=Postgraduate degree or higher, *p<=0.05, ***p<=0.001)

		Change Statistics			ANOVA	
		R Square				
Model		R Square	Change	F Change	Sig. F Change	Sig.
1		0.229	0.229	38.906	0.000***	0.000***
2		0.260	0.031	1.789	0.152	0.000***
Coefficients						
		Unstandardized Coefficients		Standardized Coefficients		
Model		B	Std. Error	Beta	t	Sig.
1	(Constant)	16.165	0.654		24.723	0.000
	No related knowledge vs. Have related knowledge	14.874	2.385	0.479	6.237	0.000***
2	(Constant)	14.273	1.097		13.006	0.000
	No related knowledge vs. Have related knowledge	13.961	2.405	0.449	5.805	0.000***
	HS vs. JC	3.031	1.749	0.151	1.733	0.086
	HS vs. UG	2.199	1.606	0.121	1.370	0.173
	HS vs PG	3.847	1.863	0.181	2.065	0.041*

6.7 Other relevant output

6.7.1 Build Your Own (BYO), Must-Haves & Unacceptables and Winning Concept

The *BYO* section in the ACBC questionnaire asked respondents to select their preferred level for each attribute and to “build” their ideal parks without trade-offs. The answers of *Must-Haves & Unacceptables* help to understand what is a “must” or an “unacceptable” for urban parks from the perspective of respondents. The data of *Winning Concept* provides the information of levels included in the overall “winning” park concept, a best park scenario after trade-offs in *Choice Tasks*. Tables 6.18 and 6.19 presented the output of *BYO*, *Must-Haves & Unacceptables* and *Winning Concept* among the whole public sample and the whole professional sample, respectively. The two tables provide the number of times each level of an attribute was selected, in percentages, compared to the number of times it was available to select in these sections of the ACBC questionnaire.

From the *BYO* data among the public respondents, the most preferred park scenario would be a park with “species rich flora and fauna,” with “supporting facilities & recreation/play facilities,” with “mix of some trees and open areas,” with “well-maintained, neat-looking” appearance, and with either “spring flowers” or “autumn colourful foliage.” For professionals, however, an ideal park scenario would be a park with “species rich flora and fauna,” with “supporting facilities & recreation/play facilities,” with “mix of some trees and open areas,” with “moderate-maintained, less neat-looking” appearance, and with either “summer green canopy trees” or “autumn colourful foliage.” Both groups indicated “species rich flora and fauna” was a component for the ideal park scenario. The two groups had divergent views regarding maintenance and seasonal views, where professionals selected “moderate-maintained, less neat-looking” and “summer green canopy trees” more often than the public.

Table 6.18 Public respondents' selections (%) for the questions of *BYO*, *Must-Haves* & *Unacceptables* and *Winning Concept*

	BYO (%)	Must-Haves (%)	Unacceptables (%)	Winning Concept (%)
Species richness				
Rich	82.1	1.4	0.7	75.0
Moderate	16.8	0.0	2.1	20.0
Poor	1.1	0.0	21.1	5.0
Facilities				
Supporting & recreation	77.1	5.7	1.4	68.2
Supporting, no recreation	19.6	0.0	7.9	26.1
Few	3.2	0.4	36.8	5.7
Woodlands				
Densely wooded	15.7	0.4	7.9	23.6
Some trees and open areas	80.0	2.5	0.4	69.6
Sparse trees	4.3	0.0	19.6	6.8
Maintenance				
Well-maintained	63.2	2.9	1.8	64.3
Moderate-maintained	31.1	0.7	5.4	25.7
Low-maintenance	5.7	0.0	31.4	10.0
Seasonal views				
Spring	42.9	0.0	1.8	35.7
Summer	16.8	0.0	2.5	17.9
Autumn	33.6	0.7	0.0	37.9
Winter	6.8	0.0	5.0	8.6

For the general public, “supporting facilities & recreation/play facilities,” “mix of some trees and open areas,” and “well-maintained, neat-looking” were required as urban park *Must-Haves*. *Unacceptable* features were “species poor flora and fauna,” “few facilities,” “sparse trees,” and “low-maintenance, wild-looking.” Among these *Unacceptables*, the most unacceptable features were “few facilities” (36.8%) and “low-maintenance, wild-looking” (31.4%) (Table 6.18). Professionals’ *Must-Haves*, however, involved “species rich flora and fauna” and “supporting facilities & recreation/play facilities” or “supporting facilities, no recreation/play facilities.” Their *Unacceptables* included “species poor flora and fauna,” “few facilities,” “sparse trees,” “well-maintained, neat-looking” or “low-maintenance, wild-looking,” and “winter branch-trunk viewing plants/conifer

trees.” The most unacceptable feature was “species poor flora and fauna” (52.5%) (Table 6.19).

Table 6.19 Professional respondents’ selections (%) for the questions of *BYO*, *Must-Haves & Unacceptables* and *Winning Concept*

	BYO (%)	Must-Haves (%)	Unacceptables (%)	Winning Concept (%)
Species richness				
Rich	85.1	10.9	0.0	87.1
Moderate	14.9	0.0	11.9	12.9
Poor	0.0	0.0	52.5	0.0
Facilities				
Supporting & recreation	54.5	3.0	12.9	51.5
Supporting, no recreation	39.6	3.0	3.0	34.7
Few	5.9	0.0	24.8	13.9
Woodlands				
Densely wooded	13.9	0.0	8.9	23.8
Some trees and open areas	86.1	2.0	0.0	73.3
Sparse trees	0.0	0.0	15.8	3.0
Maintenance				
Well-maintained	30.7	1.0	15.8	41.6
Moderate-maintained	53.5	0.0	3.0	29.7
Low-maintenance	15.8	1.0	12.9	28.7
Seasonal views				
Spring	24.8	0.0	2.0	24.8
Summer	34.7	1.0	2.0	28.7
Autumn	39.6	1.0	1.0	39.6
Winter	1.0	0.0	3.0	6.9

Comparing the results of *Must-Haves* and *Unacceptables* between the public and professionals, it can be seen that “species rich flora and fauna” and “supporting facilities, no recreation facilities” were required park features for professionals but not for the public. Furthermore, “well-maintained, neat-looking” was an unacceptable feature for professionals yet was a required one for the public. One thing to note is that for both professionals and the public, there was a larger number of *Unacceptables* selected compared to *Must-Haves*. Reasons that might be attributed to this include 1) the number of questions of *Must-*

Haves in the questionnaire were not the same as that of questions of *Unacceptables*, depending on the respondent's previous answers; 2) respondents might find it easier to identify unacceptable park features rather than what was required as a *Must-Have*.

The Winning Concept identified by ACBC among the public consisted of features of "species rich flora and fauna," "supporting facilities & recreation/play facilities," "mix of some trees and open areas," "well-maintained, neat-looking" and "spring flowers" or "autumn colourful foliage" which corresponded to the highest ranked level identified by *BYO* and utility values. As for professionals, the *Winning Concept* was composed of features of "species rich flora and fauna," "supporting facilities & recreation/play facilities," "mix of some trees and open areas," "well-maintained, neat-looking" and "autumn colourful foliage." Notably, the identification of "well-maintained, neat-looking" in the "winning concept" differed from *BYO* in that "moderate-maintained, less neat-looking" was ranked the highest among the three levels of maintenance.

6.7.2 Descriptions of wild and traditional parks

Table 6.20 provides public respondents' descriptions of the selected wild and traditional park sites according to the five attributes and the added "aesthetic value" (another relevant park attribute which emerged from focus groups and included in the early pilot conjoint survey, but was eliminated in the formal conjoint survey). Since only a small number of professionals in each city have visited the selected two park sites, their answers were not included in data analysis. Hangzhou respondents were asked to describe Jiangyangfan Eco-Park and Prince Bay Park, the two selected park sites as representations of wild and traditional parks, respectively, in focus groups. Shanghai respondents were asked to describe Houtan Wetland Park (as the wild park site used in

focus groups) and Qiantan Recreation Park (as the traditional park site used in focus groups).

Table 6.20 Hangzhou and Shanghai public respondents' selections (%) for the questions of Park Visit Experience (Note: JYF=Jiangyangfan Eco-Park, PBP=Prince Bay Park, HT=Houtan Wetland Park, QT=Qiantan Recreation Park)

	Hangzhou		Shanghai	
	JYF- Wild park (%)	PBP- Traditional park (%)	HT- Wild park (%)	QT- Traditional park (%)
Species richness				
Rich	72.7	51.5	51.1	25.0
Moderate	23.6	43.6	46.8	32.5
Poor	3.6	5.0	2.1	42.5
Facilities				
Supporting & recreation	23.5	45.5	23.4	77.5
Supporting, no recreation	25.5	46.5	31.9	20.0
Few	51.0	7.9	44.7	2.5
Woodlands				
Densely wooded	63.6	12.9	42.6	7.5
Some trees and open areas	34.5	75.2	53.2	40.0
Sparse trees	1.8	11.9	4.3	52.5
Maintenance				
Well-maintained	20.0	61.4	25.5	75.0
Moderate-maintained	30.2	36.6	38.3	20.0
Low-maintenance	49.8	2.0	36.2	5.0
Seasonal views				
Spring	30.9	69.3	29.8	55.0
Summer	54.5	7.9	40.4	10.0
Autumn	10.9	19.8	23.4	22.5
Winter	3.6	3.0	6.4	12.5
Aesthetic value				
Attractive	29.1	73.3	44.7	67.5
Moderate attractive	29.1	26.7	38.3	20.0
Unattractive	41.8	0.0	17.0	12.5

Descriptions of wild parks

Regarding “species richness,” about 70% of the public respondents in Hangzhou reported Jiangyangfan Eco-Park had “species rich flora and fauna.”

In Shanghai, while approximately half of the public respondents (51.1%) thought Houtan Wetland Park had “species rich flora and fauna,” up to 46.8% thought it had “species moderate flora and fauna.”

About half of the public respondents in Hangzhou (51%) evaluated “facilities” in Jiangyangfan Eco-Park as “few facilities,” and in Shanghai 44.7% believed Houtan Wetland Park had “few facilities.”

More than half of the public respondents in Hangzhou (63.6%) reported woodlands in Jiangyangfan Eco-Park were “wooded areas with dense trees” whereas in Shanghai, the more frequent selections were both “mix of some trees and open areas” (53.2%) and “wooded areas with dense trees” (42.6%).

Regarding “maintenance,” the most frequent choice for Jiangyangfan Eco-Park was “low-maintenance, wild-looking” (49.8%). In Shanghai, the description of maintenance in Houtan Wetland Park was mainly attributed to “moderate-maintained, less neat-looking” (38.3%) and “low-maintenance, wild-looking” (36.2%).

The description of “seasonal views” asked respondents’ favourite views across four seasons. In both Hangzhou and Shanghai, public respondents reported “summer green canopy trees” more often.

As for aesthetic value, the most frequent description of Jiangyangfan Eco-Park was “unattractive” (41.8%), whereas for Houtan Wetland Park, more frequent choices were “attractive” (44.7%) and “moderate attractive” (38.3%).

Descriptions of traditional parks

51.5% of the public respondents in Hangzhou deemed Prince Bay Park had

“species rich flora and fauna” and 43.6% believed Prince Bay Park had “species moderate flora and fauna.” For Qiantan Recreation Park in Shanghai, the most frequent choice was “species poor flora and fauna” (42.5%).

The percentage of the public respondents perceived Prince Bay Park had “supporting facilities & recreation/play facilities” (45.5%) was almost equal with the percentage who perceived it had “supporting facilities, no recreation/play facilities” (46.5%). In Shanghai, the most frequent selection for the facility situation in Houtan Wetland Park was “supporting facilities & recreation/play facilities” (77.5%).

75.2% of the Hangzhou public respondents reported a dominant presence of “mix of some trees and open areas” regarding woodlands in Prince Bay Park, and in Shanghai, 52.5% reported “sparse trees” as the dominant woodland layout in Houtan Wetland Park and 40.0% reported “mix of some trees and open areas.”

There was a consensus regarding descriptions of “maintenance,” “seasonal views” and “aesthetic value” of the traditional park sites in both Hangzhou and Shanghai: the most frequent selection was “well-maintained, neat-looking” (61.4% in Hangzhou; 75.0% in Shanghai), “spring flowers” (69.3% in Hangzhou; 55.0% in Shanghai) and “attractive” (73.3% in Hangzhou; 67.5% in Shanghai), respectively.

6.7.3 Comparisons between BYO and wild/traditional park experiences

This study described the differences between ideal urban parks and wild/traditional park experiences through the comparison between the results

of *BYO* and *Park Visit Experience* (Table 6.21).

Table 6.21 The comparison between *BYO* (ideal urban park) and *Park Visit Experience* in each city (Note: JYF=Jiangyangfan Eco-Park, PBP=Prince Bay Park, HT=Houtan Wetland Park, QT=Qiantan Recreation Park).

Hangzhou	JYF-Wild park (%)	PBP-Traditional park(%)	BYO-HZ
Species richness			
Rich	72.7	51.5	83.7
Moderate	23.6	43.6	14.3
Poor	3.6	5.0	2.0
Facilities			
Supporting & recreation	23.5	45.5	78.2
Supporting, no recreation	25.5	46.5	17.7
Few	51.0	7.9	4.1
Woodlands			
Densely wooded	63.6	12.9	17.0
Some trees and open areas	34.5	75.2	78.9
Sparse trees	1.8	11.9	4.1
Maintenance			
Well-maintained	20.0	61.4	62.6
Moderate-maintained	30.2	36.6	31.3
Low-maintenance	49.8	2.0	6.1
Shanghai	HT-Wild park (%)	QT-Traditional park (%)	BYO-SH
Species richness			
Rich	51.1	25.0	80.5
Moderate	46.8	32.5	19.5
Poor	2.1	42.5	0.0
Facilities			
Supporting & recreation	23.4	77.5	75.9
Supporting, no recreation	31.9	20.0	21.8
Few	44.7	2.5	2.3
Woodlands			
Densely wooded	42.6	7.5	14.3
Some trees and open areas	53.2	40.0	81.2
Sparse trees	4.3	52.5	4.5
Maintenance			
Well-maintained	25.5	75.0	63.9
Moderate-maintained	38.3	20.0	30.8
Low-maintenance	36.2	5.0	5.3

The majority of the Hangzhou residents preferred “species rich flora and fauna” in urban parks and thought the wild park site Jiangyangfan Eco-Park was characterised by this feature. In Shanghai, most public respondents would like to see “species rich flora and fauna,” and approximately half of the public respondents (51.1%) found Houtan Wetland Park was species rich. Yet quite a number (46.8 %) found this park species moderate.

For the attribute “facilities,” most Hangzhou residents would like to see “supporting facilities & recreation facilities,” but they more often reported having access to “few facilities” in the wild park site, Jiangyangfan Eco-Park. This was also true in Shanghai where respondents tended to report “few facilities” as the facility situation in Houtan Wetland Park, yet they would prefer to have “supporting facilities & recreation facilities.”

The difference between the ideal park and the experience of wild parks was also identified for the “woodlands” attribute in Hangzhou, where 78.9% preferred to have a “mix of some trees and open areas,” but 63.6% described Jiangyangfan Eco-Park was characterised by “wooded areas with dense trees.” In Shanghai, most public respondents preferred a “mix of some trees and open areas,” and 53.2% reported Houtan Wetland Park was dominated by “mix of some trees and open areas,” but still, 42.6% believed it was dominated by “wooded areas with dense trees.”

There was a difference between the ideal maintenance situation and the experience of maintenance in the wild park site in Hangzhou: while the majority (62.6%) wanted to have a “well-maintained, neat-looking” park appearance, Jiangyangfan Eco-Park was described as “low-maintenance, wild-looking” (49.8%). Similarly, in Shanghai, the most preferred maintenance situation was well-maintained, but approximately 70% found Houtan Wetland Park moderate-

maintained and low-maintained.

Overall, it seems in Hangzhou, apart from species richness, other aspects experienced in the wild park site such as facilities, woodlands and maintenance did not conform to the ideal situations. In Shanghai, it seems that species richness and woodlands experienced in the wild park partly accorded with the ideal situations, but the facilities and maintenance experienced were not.

As for the traditional parks, in Hangzhou, about half of the public respondents reported the experience of “species rich flora and fauna” in Prince Bay Park, which corresponded to their preferences for this feature for an ideal park, yet 43.6% perceived “species moderate flora and fauna” in this park. In Shanghai, most respondents felt “species poor flora and fauna” in Qiantan Recreation Park, differing from their ideal species rich situation.

As for “facilities,” most respondents in Shanghai preferred “supporting facilities & recreation/play facilities” and saw this in Qiantan Recreation Park. In Hangzhou, while the most preferred situation was the combination of supporting facilities and recreation/play facilities, 45.5% saw this in Prince Bay Park, and 46.5% believed this park had only “supporting facilities, no recreation/play facilities.”

The aspect of woodlands experienced in the traditional park case in Hangzhou conformed to the ideal situation. In Shanghai where the “mix of some trees and open areas” was the most preferred, 52.5% reported “sparse trees” in Qiantan Recreation Park and 40% reported a “mix of some trees and open areas.”

In both cities, most public respondents would like to see a park with “well-maintained, neat-looking” appearance and found this in the traditional park sites.

Overall, in both Hangzhou and Shanghai, the aspect of maintenance experienced in the traditional park sites conformed to the ideal situation. Apart from maintenance, in Shanghai, facilities experienced in the traditional park also accorded with the ideal situation, and woodlands experienced in Hangzhou's traditional park met with the ideal situation. The aspect of species richness perceived in Shanghai's traditional park differed from the ideal condition. However, in Hangzhou, it seems the species richness experienced in the traditional park partly accorded with the ideal situation.

6.8 Summary

This chapter provides the findings of a quantitative conjoint analysis. A summary of the key findings is shown below.

Research questions addressed	Sections in this chapter	Main findings
<u>Research questions 1 & 2:</u> Public preferences for biodiversity and the importance of biodiversity compared with other park attributes	Section 6.2	• In the whole public sample and in each city's public sample, higher levels of species richness were significantly preferred over lower levels. • In Hangzhou, both species richness and facilities were the most important attributes, whereas in Shanghai, species richness assumed the fourth ranking in terms of the relative importance, and respondents valued facilities the most. The significant higher importance value attached to species richness than to maintenance was found in Hangzhou but not in Shanghai.
<u>Research question 3:</u> Interactions between public preferences for biodiversity and for other attributes	Section 6.3	• In the whole public sample and in each city's public sample, there were significant positive correlations between preferences for 1) "species rich flora and fauna" and "few facilities," 2) "species moderate flora and fauna" and "supporting facilities, no recreation/play facilities," 3) "species poor flora and fauna" and "supporting facilities & recreation/play facilities." • In the whole public sample and in each city's public sample, there were significant positive correlations between "species rich flora and fauna" and "low-maintenance, wild-looking." Additionally, there were significant negative correlations between "species poor

		flora and fauna" and "low-maintenance, wild-looking."
<u>Research question 5 & 6:</u> Public preferences between the two park styles and environmental interventions for the wild style	Section 6.4	• The traditional park style was significantly preferred over the wild style in the whole public sample and in each city's public sample. • In the whole public sample and in each city's public sample, preferences for the wild park style were significantly enhanced by improving maintenance levels, providing recreation facilities and decreasing woodland density to a moderate level. Among all these changes, improving maintenance level to "well-maintained, neat-looking" would bring the greatest improvement of preferences for the wild park scenario.
<u>Research question 7:</u> Preferences for park biodiversity and for the wild park style between different groups of the public and between the public and professionals	Sections 6.5 and 6.6	• In Shanghai, education presented significant differences in the valuation of species richness: those with postgraduate degree or higher education significantly valued species richness than those with high school or below education. In Shanghai, professionals significantly valued species richness compared with the general public. • The factor of city of residence was a strong predictor for the perceived relative importance of species richness: Hangzhou residents significantly valued species richness compared with Shanghai residents. • In contrast to the public, in both cities, professionals significantly preferred the wild park scenario over the traditional one. Moreover, professionals significantly preferred the wild park scenario more than the public.
		• Both public and professional respondents indicated "species rich flora and fauna" was a feature for the ideal park scenario. • For the public, "species poor flora and fauna" was a frequently selected unacceptable feature for urban parks, but "species rich flora and fauna" was not a frequently selected must-have feature.

Chapter 7: Results of semi-structured interviews

7.1 Introduction

The results of conjoint analysis presented in the previous chapter revealed six notable findings:

1) In both Hangzhou and Shanghai, the public preferred higher levels of species richness in urban parks.

2) In Hangzhou, the public considered species richness and facilities to be the most important park attributes. In Shanghai, facilities were valued the most.

3) In both cities, there was a significant positive correlation between “species rich flora and fauna” and “few facilities.” There was also a significant positive correlation between “species rich flora and fauna” and “low-maintenance, wild-looking” in both cities.

4) The public in both cities significantly preferred the traditional park scenario over the wild one, despite a general appreciation of higher biodiversity richness.

5) In both cities, environmental interventions, including adding more facilities, decreasing woodland density to a semi-open condition, and enhancing maintenance levels, could significantly improve public preferences for the wild park scenario.

6) In Shanghai, professionals valued the attribute “species richness” significantly more than the public did, and in both cities, professionals preferred the wild park style over the traditional style. The importance of education for the appreciation of species richness was evident in Shanghai. In addition, Hangzhou residents significantly valued species richness more than Shanghai residents.

Semi-structured interviews were used to interpret and explain these six notable findings. The interviewees were a subset of the respondents who completed the conjoint questionnaire, and they volunteered for the interviews. The topics discussed in the interviews were established based on the notable findings that emerged from conjoint analysis. The topic guide used for the semi-structured interviews comprised the following four themes:

1. Public responses to biodiversity in urban parks
2. Public preferences between wild and traditional park styles, and beneficial environmental interventions for the wild park style
3. Preferences for park biodiversity and for the wild park style between different groups
4. Potential approaches for promoting both urban biodiversity and public appreciation

This chapter presents these four themes, with associated quotes. Sections 7.2 and 7.3 (themes 1 and 2) present relevant data from interviews with the public. Section 7.4 (theme 3) presents relevant data from interviews with professionals and some results from the public interviews. Section 7.5 (theme 4) presents the associated data from interviews with professionals. Where quoted, interviewees' information indicates their city of residence, status (public or professional), gender and interviewee number (e.g. HZ-PUB-M-8 = Hangzhou, member of the public, male, number 8).

7.2 Public responses to biodiversity in urban parks

7.2.1 Attitudes towards biodiversity in urban parks

Public interviewees were first asked to talk about their understanding of the term "biodiversity." The majority of the interviewees had heard of the term and

they frequently linked it to the idea of “variety of plant and animal species.” Interviewees were then asked to indicate their preferences for three levels of biodiversity (i.e. high, medium, low) in parks. In each city, the majority preferred the high level. Some participants, however, reported their preferences for the medium level and noted that the level of biodiversity should be appropriate in parks, showing a mixed and nuanced attitude towards park biodiversity.

When analysing the reasons for public interviewees’ attitudes towards biodiversity in urban parks, five dimensions emerged: 1) benefits to well-being, 2) aesthetic value, 3) significance for a healthy ecological environment, 4) intrinsic value and 5) messy appearance, conflicts with humans and challenges (associated with the mixed attitude).

7.2.1.1 Benefits to well-being

A frequently mentioned reason for public interviewees’ preferences for the high level of park biodiversity was the benefits to well-being that participants experienced from green spaces with a variety of plants and animals. The interviewees primarily mentioned a sense of *general happiness*, that is, improvement to mood. Public interviewees from both cities constantly talked about their delight in seeing diverse plants and animals. Words such as “harmonious” and “harmony” were frequently used when they described this kind of joy. As one participant stated:

HZ-PUB-M-8: I just like diverse plants and animals. It’s my personal preference. I’m happy and delighted to see them live harmoniously ... yes ... happiness. I love nature.

For some participants, happiness seemed to come from contacting with particular, ornamental animals, for example, pigeons, rather than contacting with general wildlife.

SH-PUB-F-18: I would like to see more animal species in parks, but ... I mean ... some cute animals, such as squirrels or pigeons. When I was abroad,

I was very impressed by the many pigeons in European parks. It's wonderful to feed pigeons and watch animals. People's Park also has many pigeons. You just feel very happy and relaxed.

In Shanghai, there were references to *poly-sensual embodied experiences* of contacting with flora and fauna rich environments, including seeing birds and green plants, smelling flowers, listening to the sounds of water and birds, breathing clean and fresh air and experiencing relief for the eyes. In particular, birdsongs were mentioned in relation to their restorative effects.

SH-PUB-F-2: You get biodiversity, you get more trees and more birds. There will be birds chirping in trees. It's comfortable ... it helps me to forget unpleasant things.

Interestingly, one Shanghai interviewee mentioned that the demand for biodiversity was indicative of *the improvement of quality of life*. He saw biodiversity conservation/enhancement as a spiritual matter, bringing happiness to people, and as an indicator of the improvement of quality of life beyond achieving the basics for living.

SH-PUB-M-16: After economic development to a certain extent in Chinese cities ... I mean, after the problem of food and clothing has been solved and the material conditions have been met, then our cities should pursue the biological ... the diversity of wildlife and plants, and ecological protection. Because people's needs for material have basically been satisfied ... They will have more need for spiritual life, and it is often the environment of our city, the nature in our city or the diversity of flora and fauna that brings people spiritual pleasure. This is in line with human beings' pursuit.

7.2.1.2 Aesthetic value

In both cities, some interviewees mentioned that the aesthetic value of biodiversity was the reason why they were positive about its presence in parks. Some public interviewees felt that animals brought vitality to a static vegetated scene, creating a dynamic, living and changing landscape, which increased their enjoyment. As one of the interviewees said:

SH-PUB-F-18: Additionally, as we talk about biodiversity, I feel that just

watching scenery is boring. Animals would add dynamics. Yes, the combination of the static and dynamic.

Specifically, birds were considered ornamentally attractive. Interviewees reported that many older Chinese people enjoyed taking pictures of birds. For example, older people were interested in photographing kingfishers and light-vented bulbuls (Chinese bulbul).

SH-PUB-F-20: If there is more diversity in the park, for example, birds ... I don't know if you know ... but there are many older people who are photography enthusiasts. They like to take pictures of birds, for example, kingfishers, Chinese bulbuls or others. Some older people build a micro-landscape to attract birds and feed them. They pick a branch with some insects and put out feed to attract kingfishers. Some people also use a water tank. Yes, they put fish in the tank, and then kingfishers will go into the water to eat the fish. I suppose they also hope that the ecological environment can be better, so there will be more birds in parks.

7.2.1.3 Healthy ecological urban environment

In both cities, interviewees also mentioned the benefits of biodiversity to a healthy ecological urban environment, including air pollutant absorption, noise abatement and temperature regulation.

HZ-PUB-F-7: I used to work at the opposite side of Xixi Wetland Park. So, first, you can see large patches of wetland from the office, and you feel good. Second, the air is obviously better than in the city centre. Wetlands are urban lungs. Then, the wetlands lower the temperature, yes, they have a cooling effect. In the city centre, your car will not have frost on it in winter, but if you park near Xixi Wetland, it will have frost. Wetlands actually have a cooling effect.

7.2.1.4 Intrinsic value

A few interviewees' positive attitudes towards biodiversity were based on the concept that all species had their own intrinsic value. Nevertheless, this moral-based appreciation was referenced much less than other reasons, as presented before.

SH-PUB-F-6: Because I think living things other than humans should have their own places to live ... they should have their own home ... We humans can't treat all the land as our own entertainment and leisure places. We should respect other species and try to protect them, not only in the cities but also in the countryside and other urban places, such as streets, residential communities or workplaces.

7.2.1.5 Messy appearance, conflicts with humans and challenges

One Hangzhou interviewee found that parks with diverse plants and animals often appeared messy, such as the green space of Maojiabu in Hangzhou, especially in winter (Figure 7.1). She believed that Maojiabu did not fit the urban image.

HZ-PUB-F-1: A certain level is acceptable but ... Personally speaking, I'm not very fond of seeing diverse plants and animals, especially wildlife, in an urban park. If it is just a park with different wildlife species or plants, it often looks very messy, like Maojiabu, especially in winter. After all, it is an urban park, not a forest. Parks should be tidy and clean to match our city.



Figure 7.1 One Hangzhou interviewee mentioned that Hangzhou's Maojiabu Green Space was messy and untidy (Ali, 2013)

Several participants mentioned clearly that they liked plant diversity but not wildlife diversity. They were concerned about possible conflicts between wildlife and humans, including fear caused by some wildlife (e.g. reptiles), negative

sentiments (mosquitoes) and attacks on visitors/their pets.

SH-PUB-F-12: I think plant diversity is good, but animals ... I don't like the presence of wildlife in parks. I often walk my dog in parks. Wildlife may attack my dog or me.

XLH: What kind of wildlife bothers you, specifically?

SH-PUB-F-12: Well ... Like snakes... I once saw a snake in a park, and I was frightened. And mosquitoes.

Some interviewees said that they were willing to see rich biodiversity in urban parks, but they believed that this was challenging in the face of human activities and disturbances in and around parks. From their perspective, urban parks are located in cities with large populations, which might not be suitable for biodiversity conservation/enhancement.

HZ-PUB-F-3: Personally, I would prefer to see the enhancement of biodiversity, especially small animals. I think it may be more interesting. Yes, this is my personal preference. But, in fact, I also know one thing: you can't keep wildlife in captivity. When residents visit parks, whether they can protect them is a problem. I personally think that if parks have wildlife ... because biodiversity includes plants and wildlife ... if you increase wildlife, there will be more interest ... you take children to teach them about species. It is interesting. But on the other hand, I don't think residents have such good quality now, I mean, trying to protect and not interfere with wildlife. So, risks exist.

7.2.2 Relative importance of biodiversity in urban parks

7.2.2.1 Hangzhou

Interviewees were asked to rank the five park attributes (i.e. biodiversity, facilities, woodlands, maintenance and seasonal views) according to their relative importance and to give reasons for their rankings. About half of the Hangzhou public interviewees believed biodiversity was the most important park attribute. Their motivations for the prioritisation of biodiversity mainly centred around 1) their personal preferences for a natural park, 2) personal interest in plants and animals and 3) their pleasant experiences of visiting local biodiverse wetland or forest parks and green spaces.

Some participants said they personally preferred a natural park with diverse green plants and wildlife, rather than an artificial park with many facilities. However, while they cared about plants and wildlife, almost all of them felt that some basic supporting facilities, for example, benches, resting facilities, bins and signs, should be available. The presence of entertainment facilities, venues or fitness equipment was perceived inappropriate, since they were considered likely to destroy the naturalness of a site.

HZ-PUB-F-3: I personally prefer the natural ... I prefer plants and animals ... more natural attributes and less artificial intervention or elements. So, I put biodiversity in the first place.

XLH: So, you also consider facilities and maintenance not that important?

HZ-PUB-F-3: Yes ... But as it is a park ... I mean, some basic facilities should be available, such as benches, bins and others ...

XLH: What about entertainment facilities and fitness equipment?

HZ-PUB-F-3: No ... No ... These are inappropriate ... I think they destroy the natural atmosphere. Also, they are probably not good for ecology.

There were references to personal interests in plants and animals. Interestingly, interviewees also talked about their planting, gardening and bird feeding activities on their balconies or in their home gardens (Figure 7.2).

HZ-PUB-F-14: I'm interested in plants and animals and such things. I have a small garden in my backyard. Many plant species can be found there! Just my interest. I like these natural things.

HZ-PUB-M-11: I enjoy watching birds and listening to birdsongs. Keeping birds is my hobby. I often put bird feed on my balcony to attract birds. It's very interesting.



Figure 7.2 Hangzhou residents' gardening activities in home gardens (Lu, 2021).

Several interviewees talked with obvious delight about their pleasant experiences of visiting parks and green spaces in Hangzhou, for example, Xi'xi Wetland Park, Jiangyangfan Eco-Park, Liangzhu Park and Beigaofeng¹⁸. They considered these UGSs biodiverse, with a variety of plants and wildlife, which was an important attraction factor. Most of them had a general feeling that Hangzhou is rich in urban biodiversity.

HZ-PUB-M-11: Well ... because biodiversity ... Hangzhou has extensive hills. We often visit Beigaofeng. Its green space is low maintenance, very natural and ecological ... We feel very relaxed, and we breathe clean air there.

XLH: What do you think about the biodiversity situation in Beigaofeng?

HZ-PUB-M-11: It's good ... it's good. I take my children there. You see many, many different insects and plants there. We should let kids know that there are many such insects in our lives.

Those who ranked facilities as the most important park attribute emphasised that the setting of urban parks indicated that human needs and social imperatives should be prioritised. In this sense, the provision of facilities was essential. One interviewee mentioned that the hills and lower mountains in the vicinity of West Lake were forest-like environments where a good footpath system was absent. He felt it was inconvenient to visit these UGSs, even if he wanted to.

¹⁸ Beigaofeng is a well-known hill in the lower mountains in the vicinity of West Lake.

HZ-PUB-M-12: Parks must have enough facilities. Urban parks ... they need to serve people. You know the West Lake Scenic Area is a very large area ... From West Lake to places like Beigaofeng and Lingyin Temple, there are many places, like forests. If these forest-like places lack artificial facilities and intervention, for example, good path systems ... we cannot get close to them even if we want to ...

7.2.2.2 Shanghai

A number of public interviewees in Shanghai considered facilities as the most important park attribute. They mostly justified this by pointing out that urban parks were strongly associated with utilitarian purposes (people's everyday activities) rather than ecological purposes. Two participants mentioned that facilities in urban parks served as environmental amenities that supported users' needs and attracted people. A park can only be sustained if people like it and use it continuously.

SH-PUB-M-9: If I choose a park, I definitely prioritise facilities. We only go to parks where people can have fun and enjoy convenient amenities. If a park only has biological species, it may not be used by people ... families will not use it. That's actually pretty bad for the park. But if you build it very well and plan good facilities there, it will attract people. You build a park; you definitely want people to use it. If a park lacks toilets, stores and resting facilities, no one wants to go there. I just think everything needs capital and popularity. An abandoned park is not good for its sustainability.

According to several interviewees, since Shanghai is a large international city, diverse and convenient facilities and services should be considered first in park design to deliver humanised experiences, not only for the residents but also for foreign visitors. From their perspective, diverse and convenient facilities are strongly connected with a good experience of a city. A park with good facilities reflects well on its investors and owners; in China, these tend to be the municipality.

SH-PUB-F-10: A park is a public infrastructure, isn't it? Well, our government has already considered these things. You see Shanghai's parks; they all have very good facilities.

However, perceiving facilities as more important than biodiversity does not mean biodiversity is disliked. In fact, several of the interviewees who selected facilities as the most important attribute had indicated their preferences for higher levels of biodiversity in parks in previous discussions.

7.2.3 Interactions between preferences for biodiversity and for other park attributes

7.2.3.1 Biodiversity and facilities

In both cities, those who had previously expressed their preferences for a high level of biodiversity generally stated their preferences for the level of supporting facilities without recreation/play facilities, that is, a moderate level of facilities provision. Basic facilities, such as benches, good footpaths, bins and toilets, should be available to meet people's demands, while play facilities for children and sports facilities were considered unnecessary. Interviewees stressed that parks were not amusement venues; they were places to rest and to experience nature. Additionally, several interviewees mentioned that residential communities had fitness equipment, basketball courts and other sports facilities to satisfy physical needs; thus, it was unnecessary to add them in parks. However, parks should not be too natural, wilderness-like, without any artificial intervention.

HZ-PUB-F-10: Because I think facilities ... at least you should have simple facilities, like benches, or benches with shade, toilets, whatever ... for convenience.

XLH: You don't want recreation or play facilities?

HZ-PUB-F-10: In parks ... I don't think they are necessary. Residential communities already have play facilities or sports facilities. I just feel ... you know ... outdoors ... some good areas with wetlands or woodlands ... if you put in these playthings or sports things, wouldn't this destroy the landscape, the natural landscape?

Interestingly, there were references to the possible negative impacts on the ecological environment caused by human interference and the construction of facilities. But interviewees mentioned that some supporting facilities were still needed and people's basic needs (e.g. sitting, resting, walking) in parks cannot be compromised.

HZ-PUB-M-11: If you artificialise the site, I think it may cause soil compaction or things that are not ecological. Artificial facilities occupy the park and will encroach on vegetated areas. A park must be dominated by plants. If you build too many roads and facilities, there will be very few plants.

7.2.3.2 Biodiversity and maintenance

In Hangzhou, a portion of the public interviewees who preferred rich biodiversity valued low maintenance because they thought that relatively wild areas were beneficial for the ecological environment due to little human interference. Several of them felt that low maintenance tended to be low cost, which represented tax cuts (park maintenance is mainly paid for by residents' taxes).

HZ-PUB-F-2: High-intensive maintenance may not be beneficial for the environment. Humans need to maintain a distance from natural things, for example, wild rabbits. Also, maintenance requires funding. As a citizen, I know the funding comes from government taxes. I definitely want a low-cost park (laugh). It represents tax cuts.

Some Hangzhou public interviewees who preferred rich biodiversity, however, reported their preferences for moderate maintenance. They believed that a certain level of maintenance indicated the government's care and commitment to parks, thereby also expressing the government's responsibility for residents' daily lives. However, a high-maintenance approach was not considered necessary because it was perceived as costly and possibly ecologically harmful (e.g. not beneficial to the natural growth of plant and animal communities).

HZ-PUB-F-14: Certainly, I prefer plants and animals to grow naturally, so maintenance intensity should not be very frequent. However, you cannot neglect and abandon parks. The government should be responsible for the maintenance. This means care for our residents.

In Shanghai, those who favoured rich biodiversity gave varied responses in terms of preferences for maintenance levels. Several preferred high-maintenance. One justification was that they like to see neatness and tidiness. A few interviewees further stressed that parks in the urban context should be well maintained and tidy but that if the context was rural, high-maintenance would be inappropriate and unnecessary.

SH-PUB-F-10: Again, I just think neatness is important for urban parks, but if you say a rural park, it does not have to be neat-looking.

Some Shanghai interviewees mentioned that maintenance and care were important in sustaining parks and their associated ecosystems. One interviewee used a case of a park lacking maintenance to justify this opinion.

SH-PUB-F-19: I remember a park near my university ... It is closed now. It initially had woodlands, grasslands and wetlands ... these landscapes. But it lacked maintenance ... then it looked like a neglected space because no one cared for and maintained it. Residents had bad impressions. It was finally abandoned, and the dumping of rubbish was even permitted! This is certainly bad for the landscapes in this park. I just think maintenance sustains a park.

Other Shanghai interviewees who had already indicated their preferences for a high biodiversity level preferred moderate maintenance intensity. Their justifications largely overlapped with those revealed in Hangzhou.

7.3 Public preferences between wild and traditional park styles, and beneficial environmental interventions for the wild park style

In this part of the interviews, public interviewees were asked about their preferences between wild and traditional park styles. Manipulated photographs, representing wild and traditional park styles (Figure 7.3), were used, allowing interviews to explore interviewees' responses without using certain words, such

as wild or traditional, that could cause confusion among interviewees.



Figure 7.3 Manipulated photographs representing wild and traditional park styles

7.3.1 Preferences between wild and traditional park styles

In each city, most of the public interviewees preferred the traditional style (13 out of 20 participants in Shanghai, 12 out of 17 participants in Hangzhou). There were general references to the perceived aesthetic value of the traditional park style when asked about their motivations for preferring this style. Words and phrases such as “it looks nice,” “beautiful,” “pretty” and “picturesque” were used to describe the traditional park style. The presence of ornamental plants, particularly, colourful flowers, was reported to make the traditional style more favourable.

HZ-F-PUB-10: Because it has many beautiful flowers. It’s picturesque. It is formal and carefully designed. But this one [the wild park style] is like a country road. It has woodlands, green and natural but not beautiful.

Public interviewees also mentioned that different facilities and recreational amenities (e.g. benches, good footpaths, bins, play facilities and services)

appeared on the traditional park style photo, making the park functional and useful for recreation and everyday activities.

SH-PUB-F-19: I feel this one [the traditional park style] ... you can walk and relax there ... you can use this park. Urban residents definitely use this park more. It is not a particular place where you go for a trip, yet you can walk in it every day. That one [the wild park style] is like a wooded area in wild mountains. Perhaps we would drive a car to get there and have fun. You see abundant trees and vegetation. But it does not have sufficient facilities. You may just come there to feel nature and take in the forest.

Several interviewees mentioned that their motivation was the well-kept appearance/high-maintenance level of the traditional park style. The wild park was perceived as lacking maintenance, appearing messy, weedy and wild. Interestingly, Shanghai public interviewees stated that the traditional park is a park that Chinese people are familiar with and use in their daily lives. It is a park where one sees neatness, lawns, ornaments and sufficient facilities. Some participants mentioned that more open areas in the traditional park could be used for recreation, such as picnicking and group dancing, whereas the wild park was dominated by enclosed woodlands, making it inappropriate for activities. There were concerns about the safety of the wild park. Notably, these concerns were all voiced by female interviewees. By contrast, the traditional park was thought to be quite safe.

SH-PUB-F-12: Because I feel safe in this park [the traditional park style]. That one [the wild park style] is suitable for adventurous play, but what if a guy comes out of the woodlands and hurts you? I would not visit this park [the wild park style] alone.

In terms of preferences for the wild park style, interviewees mentioned that this park type was ecological with more wildlife species. It could provide a natural place in which one may experience a sense of relief and get respite from the city, implying the restorative potential of this park style. Additionally, the wild park was perceived as having a *wild charm* of its own (the phrase *wild charm* –

the Chinese translation of 野趣¹⁹—was used directly by interviewees).

SH-PUB-F-18: Personally speaking, when I visit parks ... I am quite impetuous. I hope I can calm down and experience nature, so I like a more nature-like park. I can take a walk in it, with headphones on. In such an environment, people feel relaxed.

HZ-PUB-F-7: In my opinion, it is good when a park has wild charm. If it is heavily maintained, it will appear like lawns near residential communities, shopping malls or office buildings. It may lose its distinctive character.

XLH: Then what do you think about a park like this [the traditional park style]? How do you view this compared with lawns near residential communities, shopping malls or office buildings?

HZ-PUB-F-7: The park just looks like the landscape near residential communities or schools, perhaps considered for protecting the child or for security reasons. I just feel a nature-like park is better. It is just my personal preference.

Interestingly, in both cities, there were references to memories of the countryside as a justification for preferences for the wild park style. Some interviewees recalled the time when they lived in the countryside as a child and happily talked about their memories of the countryside.

HZ-PUB-F-5: This park looks very rural ... you know ... the countryside ... We have an eagerness. I mean, get back to nature and the countryside. I often saw some trees in the countryside when I was a kid, like persimmon trees, poplar trees or whatever. Also wildflowers, jujube trees. They were all wild. They grew naturally.

Indeed, during interviews, all public interviewees were asked about perceptions of the biodiversity levels²⁰ between the two park styles.²¹ In each city, most of the public interviewees (12 out of 17 participants in Hangzhou, 14 out of 20 participants in Shanghai) believed the wild park had higher biodiversity levels compared with the traditional park.

¹⁹ The word “野趣” is usually used in Chinese people’s daily lives to describe a natural, wild landscape that evokes a pleasant experience.

²⁰ Those who had not heard of the word biodiversity were asked about their perception of species richness of flora and fauna between the two park styles.

²¹ Public interviewees who had already spontaneously mentioned their perception of the biodiversity levels between the two park styles were not asked this question.

In both cities, several interviewees also stated that their preferences depended on the purpose of the visit. For example, they liked to visit a traditional park to see flowers and beautiful scenery and have recreational activities, whereas a wild park could be ecological habitats for plants and animals or places where people go to walk, relax and enjoy fresh air.

7.3.2 Environmental interventions for the wild park style

Interviewees were asked about what they would like to see changed for the wild park style. More flowering plants were requested. Notably, two interviewees implied that the adding of flowering plants should be done discreetly to avoid making the wild park too colourful, which would destroy its natural quality. They suggested it would be appropriate to add flowering plants along the main footpaths or in places people can easily get to but that large-scale planting of flowering plants was not necessary.

SH-PUB-F-19: Adding more flowers is great, but I think it should be done in an appropriate way. For example, adding flowers in open spaces or some areas that people can easily reach or whatever. The effect of large-scale flowers or flowerbeds is not very good, as it is not natural.

Some interviewees suggested that wildflowers would be more appropriate in the wild park setting than the ornamental flowers with very bright colours that they commonly see in conventional flowerbeds.

SH-PUB-M-16: I see many flowers in this picture [the traditional park]. This [the wild park] is all green. In fact, putting more colourful flowers in this [the wild park] is better. Yes, more colours, but not flowerbeds. They are too bright, too dramatic. They impact the natural atmosphere. Wildflowers are better.

The incorporation of more facilities was suggested by many interviewees, reinforcing relevant results from focus groups and conjoint analysis. Specific facilities that were mentioned included more benches (with shelters, as suggested by some middle-aged interviewees), more bins, more paths,

pavilions, surveillance cameras (considering the safety issue), lighting, toilets, convenience stores, and boards or signs introducing trees and plants. Recreation facilities related to wildlife, such as bird houses and feeding venues, were suggested by some Hangzhou interviewees. They had seen similar venues near West Lake (Figure 7.4).

HZ-PUB-F-2: I think you could introduce feeding venues. Take Hangzhou as an example. We know there are high populations of squirrels and waterfowl near West Lake. After many years of interacting with tourists, they are actually not afraid of people. Then you see many squirrels ... The venue has artificial facilities, like fences around trees. Tourists stand outside fences and feed the squirrels corn, peanuts, melon seeds and other feed. Some people also feed bread to the mandarin ducks. Managers patrol regularly to prevent harm to the mandarin ducks. I mean, we can add these things to promote a harmonious atmosphere between people and animals.



Figure 7.4 People watch and feed squirrels around an old tree near West Lake, Hangzhou (photographed by the author)

Additionally, public interviewees would like to see more open, usable spaces, where they could have activities and watch the scenery, in wild parks. Open spaces were also perceived as safer. More care and maintenance were suggested. Notably, some participants felt that areas that people used intensively should be maintained frequently to make them look neat and tidy but that other areas could be maintained in a low-intensive manner to permit the natural growth of plants and animals.

SH-PUB-F-19: I don't know what this park looks like in real life or its entire appearance ... but ... erm ... I also think some areas ... you see here [pointing to the ponds in the lower right corner of the photograph], it looks too wild, you see, it is overgrown ... Maintenance is necessary for this area ... It is an area close to people ... Areas not close to people or not for people's use do not need very intensive maintenance.

7.3.3 Perceptions of spontaneous vegetation and dead wood

All public interviewees were asked about their attitudes towards spontaneous vegetation and dead wood. Surprisingly, in each city, these were generally acceptable to most public interviewees and could be retained/introduced in urban parks without necessarily making parks unattractive or unsafe. Justifications for the acceptance of spontaneous vegetation and dead wood involved: 1) they are natural, 2) they are local and native, belonging to this area, 3) they are ecological and an element of urban biodiversity, 4) some have medicinal value (this interviewee also mentioned picking herbs) and 5) dead wood can have very interesting branches and bark patterns. However, if spontaneous vegetation and dead wood impacted parks' aesthetic quality and sense of safety, they should be maintained, cleaned up or even removed from parks.

HZ-PUB-M-11: They are natural. You know ... they are biological things ... they grow in this area, so they are local and native to the area.

HZ-PUB-F-2: I think they should be retained, for example, you see many wild plants in Xi'xi Wetland ... you let wild plants grow naturally in shrubs. They are not planted by people. You cannot see that kind of wild character in artificially planted things. Xixi Wetland also has much water and many small ponds, and you can find wild plants nearby ponds. It's good. We don't have to remove them. Fungus or mushrooms might grow on dead wood. We can tell kids that species grow on dead wood. When the temperature and humidity reach a certain level, we can see the production of mushrooms. This is ecological biodiversity.

HZ-PUB-F-16: In fact, a lot of wild plants are medical herbs. They are Chinese medicine. People do not know ... many people think they are weeds or grasses, but they are actually treasures.

XLH: You are very interested in these plants?

HZ-PUB-F-16: Yes, we live here, and our community is like a park. And I see some people clear these plants ... these medical herbs ... I feel sad ... I like those herbs. Sometimes I pick herbs to use when I need them. It's a pity people remove them.

XLH: What do you think we should do with these wild plants?

HZ-PUB-F-16: Selectively ... I mean selective clearing. Some are herbs. Herbs like Wulian Plum, it's like ... uh ... vines ... it has vines ... it is herbaceous and has vines. It's a bit messy. Maybe we can remove messy plants. Some herbs are not pretty, but some can be retained.

SH-PUB-F-12: I think these plants are interesting. You know ... fallen trees and wood ... interesting branches or bark.

SH-PUB-F-20: I'd probably prefer not to deal with them if they don't interfere with walking and safety. They are natural. For example, fallen trees, they become such decomposition objects, breeding grounds, soils ... a source of fertilizer. They are part of nature.

Public interviewees also stated that these wild plants could be cleared along footpaths, but they could be retained in wild areas with low visual permeability.

SH-PUB-F-19: I think a couple of metres on either side of a footpath, you could remove them ... but ... in deep, wild areas, you could let them grow naturally. Wild and spontaneous plants are elements of nature's circle. However, if paths for walking are too natural, with fallen trees, I feel the park's visual quality would be destroyed. Certainly, most people do not want to see dead and fallen trees or weeds everywhere, so we can let these things grow naturally in areas with low visual permeability. It also protects nature.

Interestingly, two public interviewees mentioned that the preservation or introduction of these wild plants should be done carefully to avoid causing invasive species.

HZ-PUB-M-11: But if the wild plant is a foreign species, I think we need to clear them. For example, tumbleweed or other invasive species. Of course, they should be removed. But local species, like tail grass, is ok.

SH-PUB-F-20: Invasive species cause the loss of biodiversity and should be removed.

7.4 Preferences for park biodiversity and for the wild park style between different groups

7.4.1 Professionals

The professional interviewees were asked how they perceived the importance of biodiversity compared with other park attributes. Some felt that the attribute of biodiversity was the most important. They reported their strong appreciation of and concerns about ecological and biodiversity conservation/enhancement particularly for flora and fauna species for example, interest in and appreciation of plants and animals. Professionals also mentioned that with pressing environmental challenges in China, ecological protection has received much publicity across the entire country in recent years. Ecological urban greenery was promoted by national policies, such as *Ecological Civilisation*.

HZ-PRO-M-5: Personally, I like all kinds of animals and plants. I do many biodiversity surveys. When I see wild plants in the wild, I feel very happy. Therefore, I personally prefer ... emotionally speaking ... I am more inclined to support the view that parks in cities need biodiversity, and the richer, the better.

SH-PRO-M-1: Certainly ... from the perspective of ecological civilisation, which is China's basic national strategy, our country pays great attention to the conservation and restoration of biodiversity. This is an inevitable trend with policy guidance.

However, a few professional interviewees said the relative importance attached to biodiversity depended on many factors, so a general answer did not exist. For example, one landscape architect from Hangzhou talked about her consideration of site characteristics, including size, scale and the original biodiversity condition in and around the site, to determine the relative importance of biodiversity for parks.

HZ-PRO-F-2: I think it depends on its size and scale... whether the site is close to a relatively large habitat. If the site is just a patch beside a street or is very small, then there is no need to mention biodiversity. If the park's site is

close to a large river or mountain, I think emphasising biodiversity is meaningful.

Several professionals preferred the wild park style depicted in the photo and stated that this style could be beneficial for wildlife and biodiversity conservation. However, there were also concerns about the wild park style being considered less attractive than the traditional style by clients and the general public.

HZ-PRO-F-2: I personally like the wild, ecological style. It may be more ecological and biodiverse ... However, it may be difficult for clients or residents to like this one [the wild park style]. They may feel it is messy, and it is not designed.

7.4.2 Education and city of residence

The professionals were asked about how they perceived the result from the conjoint analysis that different education groups in Shanghai valued biodiversity (species richness) in parks significantly different. Some professionals mentioned that more educated individuals might have higher environmental concerns. If people had more educational opportunities, they might have greater access to related knowledge and believe that the richer the biodiversity, the better the quality of the urban environment. Others also mentioned the importance of education for improving overall public ecological literacy. Yet general education may not be enough, and specific environmental education seems more relevant (Section 7.5.3).

During interviews with public participants in Hangzhou, there were references made to the pleasant experiences with Hangzhou biodiverse parks in the interviewees' justifications for their prioritisation of biodiversity in terms of its relative importance in parks. Several interviewees also mentioned their personal interest in plants and animals and biodiversity-related activities. However, there were no such relevant references in interviews with Shanghai

residents.

Professionals were asked their opinion about the significantly higher preference for biodiversity (species richness) among Hangzhou residents compared with their peers in Shanghai. Some professionals indicated that Hangzhou residents might have more opportunity to encounter biodiverse green spaces in their daily lives, fostering stronger awareness and appreciation of park biodiversity. The city has implemented a range of UGS plans and practices that boosted biodiversity. All these efforts and achievements, along with natural resources, might function as public pedagogy built into residents' daily life.

HZ-PRO-M-5: Hangzhou's urban greening has started to emphasise low-intensive management to promote habitats' natural succession. For example, Xixi Wetland. In fact, there are also parts ... Xixi Wetland also aims for tourism ... It was built many years ago. Some parts are planted with exotic species. Also monocultures and conventional flowerbeds. But the trend is good ... Then you see Jiangyangfan Eco-Park. It is a typical biodiverse park ... ecological park. Animals and birds are there in abundance. We often conduct nature education there, which is very good. These ecological parks in Hangzhou are excellent places for fostering public awareness and appreciation of biodiversity.

One professional also mentioned that Hangzhou's urban planting efforts to promote biodiversity might be conducive to enhancing public awareness and interests in biodiversity in parks.

HZ-PRO-M-3: Hangzhou is actually doing a lot of work on biodiversity. This is also very good for enhancing people's awareness and interest ... The city already harbours many natural ecological resources, but Shanghai is more artificial, I think. Hangzhou has its own ecological greening and planting approach ... I think it evolves from Xixi Wetland. You see, the structure and composition of vegetation are very complex. You see multi-layered planting. Not like other cities where lawns ... lawns and trees dominate. You don't see ecological richness from that kind of planting. You see simplified plant communities and habitats, but they are attractive.

However, several professionals were surprised by the finding from conjoint analysis that Hangzhou residents preferred biodiversity (species richness)

significantly more than Shanghai residents. They felt residents living in cities with higher levels of economic and social development would be more likely to have higher biodiversity awareness and, thus, would be more able to appreciate biodiversity and wilder landscapes. As one professional stated:

SH-PRO-F-5: This is contrary to my expectation. I thought people in more developed areas would have stronger ecological awareness and care more about biodiversity and wilder landscapes.

7.5 Potential approaches for promoting both urban biodiversity and public appreciation

The professionals were asked about their views on potential practical approaches for promoting both urban biodiversity and public appreciation. The relevant data helped to discuss implications for practices. The scope of the discussion was not limited to the urban park context but extended to broader UGS practices in order to let these professionals explore the topic more freely. The interviewees were also encouraged to share their relevant work experience.

7.5.1 Promoting both biodiversity and recreational values

According to the professionals, many Chinese municipal projects currently advocated ecological improvement first, and landscape designers wanted their designs to be beneficial for biodiversity. However, in projects' practical implementation, clients and the public cared more about recreation, entertainment and, sometimes, commercial services. Heavy recreational activities and uses might influence or disturb biodiversity to different degrees. However, excluding people and making the park/green space site inaccessible was not beneficial for promoting public acceptance and appreciation. The interviewees proposed two elements to promote both biodiversity and

recreational values: 1) zoned spaces and 2) ecology-related recreation.

7.5.1.1 Zoned spaces

Many professionals mentioned the implementation of zoned spaces, that is, dividing a site into zones with different objectives – from biodiversity conservation to recreational activities – as a strategy to mitigate the potential disjuncture between biodiversity and recreation. Two landscape architects mentioned that in their biodiversity-related projects, ecologists and researchers often conducted prior ecological surveys and analysis and provided classification guidance on ecological and recreational planning according to ecological sensitivity analysis. For example, ecologically highly sensitive areas would be fully protected, either without accessibility and artificial construction or partly accessible by raised wooden walkways rather than conventional concrete pavements; ecologically moderately sensitive areas could be accessible, but the number of visitors would be limited; and ecologically low-sensitive areas could be fully accessible and have different planned recreational facilities/activities. One Hangzhou professional stressed that the strategy of zoning also required reasonable route planning and signage in order to make sure people would not get lost or visit inaccessible areas.

7.5.1.2 Ecology-related recreation

There were references made to the planning of ecology-related recreational facilities, such as bird houses. Several professionals also mentioned that constructed wetlands and rainwater gardens could be regarded as novel ecology-related recreational facilities. Constructed wetlands and rainwater gardens could be designed to reveal the hydrological cycles and processes of water management and to showcase how they provide ecosystem services and promote biodiversity enhancement. One Shanghai landscape architect spoke

about naturalistic children's playground design in projects from Z+T studio (Figure 7.5) as a way to let children recreate in a natural, ecological environment.



Figure 7.5 Naturalistic children's playground design from China's Z+T studio (<http://www.ztsla.com/>)

7.5.2 Promoting both biodiversity and ornamental values

Many professionals thought that biodiverse parks/green spaces in China tended to appear ordinary, and they generally felt this kind of park/green space was not very popular among the general public, clients and government officials.

SH-PRO-M-1: Actually, promoting this kind of green space in China still faces challenges. One is from the perspective of our government. Even with policy support, government officials may not fully understand this issue. And the public does not find this kind of landscape attractive, because residents are used to landscapes of artificial lawns ... People find them unattractive ... too wild.

HZ-PRO-F-2: People feel it looks like a roadside or something. They feel it is not designed.

Two approaches were proposed to make biodiverse UGSs more attractive and ornamental: 1) the addition of more flowers and 2) the use of a combination of native and non-native plant species.

7.5.2.1 The addition of more flowers

One professional, from Hangzhou Municipal Bureau of Garden and Cultural Relics, is responsible for managing Jiangyangfan Eco-Park. She stated that this urban park type for biodiversity conservation was worthwhile to promote in China but that public acceptance was a problem and that it was important to do more work to make it popular. Environmental intervention in the form of introducing flower borders filled with perennial and annual flowers along the main footpath in this park had been implemented and would be completed in 2022. Professionals also mentioned that introducing flowers not only enhanced the park's ornamental value but also provided pollination opportunities for pollinators, for example, bees and butterflies, leading to the convergence of biodiversity and ornamental value.

7.5.2.2 The use of a combination of native and non-native plant species

When talking about introducing more flowers, some professional interviewees mentioned that it was necessary to combine native and non-native species on an appropriate scale. Professionals mentioned that biodiversity design in the Chinese context was often discussed with the idea of native species, and using native species was one of the most widely recognised biodiversity-friendly design approaches. However, they felt non-native species could increase visual diversity, which may not be possible by using only native species.

One professional from Zhejiang Agriculture & Forestry University said that his recent research indicated that approximately 50% of the plant species in East China's UGSs were non-native species. These non-native species have adapted to East China's local environment, growing quite well, and have not caused much invasion. He believed these non-native species have been localised and could be regarded as native species to some extent.

7.5.3 Environmental education

The importance of environmental education to help increase public understanding and appreciation of biodiverse UGS was emphasised. Experiential environmental education approaches, such as wildlife observation, guided tours and on-site signage, were recommended. One professional said he could sense enhanced public appreciation of biodiverse UGSs after environmental education.

SH-PRO-M-1: There is a rooted social norm or recognition that the city is the space for people to live. We people have dramatically transformed the urban environment and ignored the survival of wild flora and fauna. People don't have the willingness to live in harmony with these creatures, and that's a problem. Another thing is also a cognitive one. The general public does not know much about local species, and they have no feelings for them. They just think they are not attractive ... they are very common. For example, wild grasses; people are not willing to pay attention to them. We also do nature education, including nature education for adults. We can obviously feel that ... through participating in this nature education ... Maybe they initially feel this is messy, but they also see many wild animals there ... they feel that we do need this kind of environment. Also, some people like birds or insects. People change their attitudes, and they gradually accept this kind of landscape. They see a lot of interesting things that are hard to find in traditional green spaces. This kind of experience.

7.5.4 Designing biodiversity within the traditional park design framework

Another emerging theme was the challenge of designing biodiversity within the traditional park design framework. Professionals recognised that many traditional parks in China were largely filled with exotic plant communities, which was not that beneficial for urban biodiversity. Introducing native species in certain areas to replace exotic ones was recommended. Moreover, adjusting to a less intensive plant maintenance regime, with less mowing and trimming

and no use of herbicides and pesticides, was considered key for enhancing urban biodiversity.

Several professionals proposed that certain ecological measures used in Chinese classical gardens could be used as a reference in today's traditional parks, considering both ecology and culture. They suggested that multi-layered, near-natural plantings, which can be found in classical gardens, were biodiversity-friendlier than lawns. Lawns were criticised by most professionals because of their homogeneity and the potentially negative environmental impacts resulting from the use of pesticides and intensive maintenance. Professionals also mentioned that creating and managing multi-layered, near-natural plant communities required designers and managers to have sufficient knowledge of different plant species as well as a deep understanding of such plantings in classical gardens. In addition, some professionals thought the idea of retaining spontaneous vegetation could be traced back to Chinese classical gardens, where some plants were permitted to grow wild. In traditional parks, more spontaneous vegetation in some areas might be retained to replace conventional lawns and flowerbeds.

7.5.5 Challenges and opportunities for promoting biodiversity-friendly urban green space projects in China

Professionals also spontaneously talked about challenges and opportunities for promoting biodiversity-friendly UGS projects in China. First, it was commonly felt that the acceptance by clients, residents and some government officials was a challenge. It was also considered important to move from a top-down to a bottom-up approach, involving the general public in the planning, designing and managing of biodiversity-friendly UGS projects.

Technical challenges were also mentioned. Biodiversity-friendly practices required extensive biological data as references, for example, historical information on native plant communities in the area. However, such data were usually unavailable or absent. The development of native plant species was very weak in China, and procurement of native plant species was difficult.

HZ-PRO-M-5: Many seedling companies introduce exotic species and regard this as an important means of pursuing interest. People feel foreign things are valuable, but this situation has got better in recent years. Meanwhile, the breeding of native plants is a very long process, and the patent protection is weak, making people reluctant to invest in the development of native plants.

In addition, professionals felt that although the low-intensive maintenance advocated by biodiversity-friendly practices was not labour-intensive, it was actually the continuous ecological monitoring/regulating for which scientific knowledge and technical approaches were required. Compared with the traditional, ornamental, high-maintenance approach, this type of maintenance was labour- and resource-effective, yet technically demanding. The lack of experienced and specialised staff in China in this regard was stressed.

In China, biodiversity-friendly UGS planning, design and management still need more research, yet professionals thought their ecological merits were promising against the background of China's *Ecological Civilisation* and a series of policy and planning measures. Furthermore, one professional mentioned that in the context of the continuously increasing labour cost China, low maintenance cost was a key benefit of biodiversity-friendly UGSs.

SH-PRO-M-1: But this is an inevitable trend, and green space practices will definitely go in this direction. On the one hand, policies support this. And on the other hand ... You know, the maintenance cost of the current artificial greening is too high. The labour cost is also increasing rapidly in China. In fact, there will be a shortage of maintenance workers in ten to fifteen years, as maintenance workers now are basically 50 or 60 years old. So, ten years from now, no one will do this work. If green spaces still need such high-intensive maintenance, it will eventually be difficult to afford the cost.

The professionals also mentioned many recent biodiversity-friendly precedents in urban parks (e.g. Works from Lee Parks, landscape director of AECOM) and residential communities (e.g. Zhongying Black Forest Community in Shanghai, Luhuhu Community in Chengdu), indicating biodiversity-friendly UGS projects' promised potential in China.

7.6 Summary

This chapter presents the results from semi-structured interviews with a subset of the conjoint questionnaire respondents to interpret the data obtained via conjoint analysis and to provide more in-depth and detailed answers to the research questions. Some notable findings are summarised.

The majority of the interviewees had heard of the term “biodiversity” and associated it with the idea “variety of plant and animal species.” In each city, the majority of the public interviewees preferred a high level of biodiversity in urban parks. Hangzhou public interviewees stated that they prioritised biodiversity over facilities in parks because of their personal preferences for a “natural” park and personal interest in plants and animals. They also talked about their pleasant experiences of visiting biodiverse parks and green spaces in Hangzhou. In Shanghai, some mentioned that since the topic scope was urban parks rather than nature reserves, the consideration of facilities and people’s recreational, physical and social needs should be prioritised. The professionals revealed that Hangzhou residents might have greater opportunities to encounter biodiverse green spaces in their daily lives, thereby nurturing their overall stronger awareness and recognition of park biodiversity, compared with Shanghai residents.

The majority of the public interviewees in both cities preferred the traditional

park style over the wild style, confirming the result from conjoint analysis. The public interviewees would like to see more facilities, more semi-open, usable green spaces and more care for the wild park, which again echoed the result from conjoint analysis. Notably, flowering plants (especially wildflowers) were also suggested. Some felt that areas that can be easily reached or intensively used by people should be maintained frequently, while other areas can be treated in a low-intensive manner to allow the natural growth of flora and fauna.

The professionals also discussed potential practical approaches for promoting urban biodiversity and public appreciation, including several strategies to combine biodiversity and recreational/ornamental values, environmental education, designing biodiversity within the traditional park framework, and challenges and opportunities for promoting biodiversity-friendly UGS projects in China.

PART III (Chapters 8, and 9)

Chapter 8: Discussion

8.1 Introduction

Following the chapters describing the results revealed by the three research methods (focus groups, conjoint analysis and semi-structured interviews) that were implemented in both case study cities, namely, Hangzhou and Shanghai, this chapter draws together the research results from the three methods and triangulates and discusses them, along with the literature review provided in Chapters 2 and 3, in order to answer the research questions.

8.2 Research question 1: Does the public appreciate biodiversity in urban parks?

8.2.1 General public appreciation of biodiversity in urban parks

Overall, the data from all three methods revealed a bigger picture that residents in both cities preferred higher levels of biodiversity in terms of flora and fauna species richness in urban parks. This result supports the finding from the Pan-European study by Fischer *et al.* (2018) that biodiversity at the species level in urban parks was preferred by urban residents. However, this result is inconsistent with studies from Sweden (Qiu, Lindberg and Nielsen, 2013) and Australia (Shanahan *et al.*, 2015) showing that parks with high biodiversity were not positively correlated with preferences. The public appreciation of higher species richness revealed by this research was limited to urban park contexts and cannot be extrapolated to other UGS types, although a number of Western studies reported the appreciation of biodiversity in gardens (Lindemann-Matthies and Marty, 2013), wastelands (Fischer *et al.*, 2018), and urban

meadows (Lindemann-Matthies and Bose, 2007; Southon *et al.*, 2017; Fischer *et al.*, 2020).

Semi-structured interviews clearly revealed the perceived benefits of species-rich environments to well-being as one important motivation behind public appreciation of higher species richness. Although the topic of restoration was not directly researched in this study, many references to biodiversity during interviews were related to a restorative experience. The feel-good emotion (Dallimer *et al.*, 2012) associated with actual or perceived biodiversity in UGSs was recorded by previous research from Europe (Fuller *et al.*, 2007; Dallimer *et al.*, 2012; Hoyle, Hitchmough and Jorgensen, 2017), New Zealand (Mavoa *et al.*, 2019), and Australia (Schebella *et al.*, 2019). During focus groups and interviews, words and phrases such as “diversity of plants and animals,” “natural environment” and “nature” were frequently spontaneously mentioned when participants talked about the well-being benefits, and these words were usually a substitute for the term biodiversity. This may suggest that the perceived well-being benefits raised in focus groups and interviews were closely related to the perceived benefits of natural environments to well-being. Ward Thompson (2002) stated that a desire to establish a connection with some form of nature is a fundamental need rooted deep in human tradition. Many studies have demonstrated the health and well-being benefits of access to nature in the urban environment (Kaplan and Kaplan, 1989; Colley, Brown and Montarzino, 2016).

The ancient Chinese philosophy of “oneness with nature” continues to have a profound influence today, which may help explain respondents’ appreciation of species richness in parks. “Oneness with nature” advocates for the inseparable unity of human and nature, emphasising the respect for and adherence to the laws and rhythms of nature, as well as the importance of developing harmony

with nature (section 2.4.1). It is argued that “oneness with nature” is a pro-environmental, non-anthropocentric paradigm, aligning with the contemporary global themes of nature conservation and sustainability (Chen and Wu, 2009). Such eco-oriented cultural tradition may influence Chinese people’s preferences, as reflected in classical gardening ecological concerns and measures, e.g., protection of old trees and use of native species.

Ecological protection has received much publicity in recent years in China due to pressing environmental issues that have emerged in Chinese cities. Improvements to societal openness and access to information in China have fostered public awareness, interest and knowledge of biodiversity (Chen and Jim, 2010). In the focus groups, participants mentioned that the term “biodiversity” appeared in Chinese social media and television programmes, for example, *People and Nature* and *Geography and China*. This increased exposure has raised their attention to and awareness of biodiversity. The prevailing environmental problems in China, with implications on health and wellbeing, have led to widespread publicity about the importance of biodiversity for addressing these problems. Such increased dissemination may inform lay people and help cultivate their appreciation of species-rich green spaces to some extent. In addition, there are many popular nature education institutions in Hangzhou and Shanghai, for example, Zhejiang Wilderness and Wild Earth in Hangzhou and Forest City Studio in Shanghai. However, to what extent these environmental publicity tools can have an impact on public understanding and appreciation of biodiversity cannot be identified from this study and needs to be explored further.

The reasons for the appreciation of higher species richness that were frequently mentioned in the interviews were more closely associated with human interests and benefits (e.g. benefits to well-being, aesthetic value) than with the intrinsic

value of biodiversity and species, or ethical concerns for the protection of their right to exist. In this sense, human needs and attitudes were at the centre of the reasons for the appreciation of species richness, and such appreciation may be utilitarian and anthropocentric (Chen and Jim, 2010).

From a practical perspective, the finding of public demand for higher flora and fauna species richness in parks suggests the need and opportunity to integrate biodiversity conservation/enhancement as a mandatory dimension in urban park design and management (Aronson *et al.*, 2017). However, an important issue should be stressed here, namely, whether the general public can correctly perceive the increase of species richness in urban parks. Concerns may be raised if the public has limited ability to consciously perceive biodiversity but, at the same time, declares a demand for it. If the public strongly demands park biodiversity, yet is unable to correctly perceive its increase, then related efforts in design and management may still find them difficult to satisfy public needs. The *people-biodiversity paradox* (Dallimer *et al.*, 2012; Schwartz *et al.*, 2014; Pett *et al.*, 2016) indicates a mismatch between people's appreciation of biodiversity and their limited ability to perceive biodiversity in their surroundings. Biodiversity and ecological functions can be invisible sometimes, especially for lay people who do not have much ecological knowledge (Nassauer, 1995). This study found that residents perceived differences in species richness of flora and fauna between the traditional/ornamental and wild/naturalistic park styles and residents generally considered the wild/naturalistic style more ecological and species richer.

8.2.2 Concerns about biodiversity in urban parks

The semi-structured interviews revealed residents' concerns about biodiversity in urban parks, including the perceived messy and unappealing appearance

often associated with biodiverse environments, the potential human–wildlife conflicts, and the challenge of biodiversity conservation/enhancement in urban park settings with frequent human activities. Overall, these concerns imply another side of biodiversity, namely, ecosystem disservices, i.e. “functions of ecosystems which are perceived to be negative for human well-being” (Lyytimäki and Sipilä, 2009, p. 311).

Public concerns about the possible messy appearance of biodiverse environments further indicate that urban nature conservation in reality often goes against the conventional image of a city as ordered, neat and clean. Rink and Emmrich (2005) found that German residents tended to evaluate whether urban nature was worth conservation from the perspective of its aesthetics, symbolic function, use and relevance to human well-being. Clearly, this view of conservation is not from an ecological perspective but from an anthropocentric perspective. This anthropocentric conservation perspective echoes the predominant utilitarian emphasis of the concept of “ecosystem service” in conservation (Fisher and Brown, 2014). Fisher and Brown (2014) uncovered concerns in conservation that such an anthropocentric view of conservation “marks a distinct departure for core conservation values” (Fisher and Brown, 2014, p. 268) and may not be conducive to maintaining non-utilitarian and ecocentric values of biodiversity and nature.

The concern about human–wildlife conflicts in cities has recently been in the news in China, as the number of events of wildlife appearing in Chinese cities (either intentionally introduced by humans or spontaneously wandering into cities) has increased in recent years. For example, between 2020 and 2021, a herd of wild Asian elephants left Xishuangbanna Nature Reserve and spontaneously marched north and entered Kunming, the populated capital city of Yunnan Province. The local government and residents worried about this

event because these elephants destroyed their crops and damaged their houses and infrastructure. In cities, it is more likely that smaller animals, such as insects, snakes and reptiles, impact people's lives, as they may become a nuisance, cause fear, or pose health risks (Yang, 2021b). Several interviewees in this study stated clearly that they preferred flora diversity rather than wildlife diversity in urban parks. Diverse wildlife may not be easily encountered within highly dense, urbanised Chinese cities such as Shanghai. This may have caused urban residents to have limited opportunity to nurture awareness and appreciation of fauna diversity. Their appreciation of species richness may be limited to static, passive, and scenic trees and plants, as well as the green ambiance that serves as an outdoor recreational background (Jim and Chen, 2006b).

Residents' concerns about park biodiversity were more related to the context in which it appears rather than biodiversity *per se*. Urban parks are not nature reserves, where human activities and impacts are more limited. Biodiversity conservation in cities can be more difficult to achieve than in natural/rural biomes due to the close relationship between cities and humans and possible conflicts between biodiversity and human activities and preferences (e.g. orderliness and neatness). The interviews with professionals confirm that a critical challenge for biodiversity conservation in urban environments is balancing biodiversity requirements with human demands, perceptions and use. Residents' concerns about park biodiversity, revealed in the interviews, however, did not represent an objection to biodiversity conservation/enhancement in urban parks, since several interviewees who expressed concerns also believed that urban parks should have appropriate levels of biodiversity. Such an attitude further suggests that people–biodiversity relationships in urban park contexts might be nuanced and non-straightforward (Shwartz *et al.*, 2014; Campbell-Arvai, 2019).

8.3 Research question 2: What is the importance of biodiversity in urban parks compared to other park attributes?

Following the examination of the preferences for different levels of biodiversity in urban parks, this question tries to understand the importance of biodiversity (represented as flora and fauna species richness) compared with other relevant park attributes raised in the focus groups, namely, facilities, woodlands, maintenance and seasonal views. In Hangzhou, conjoint analysis showed that both facilities and species richness were the most important park attributes and were almost equally important. Previous studies revealed the prioritisation of biodiversity over recreation facilities (Chen *et al.*, 2018) and cultural services (Yang, 2021a) among residents. However, this was not confirmed in Hangzhou. For practices, Hangzhou residents' high preferences for facilities and species richness call attention to prioritising the two aspects in park design. Residents' high preferences for species richness support the prioritisation of biodiversity improvement in policies and practices for the biodiversity-friendly development of urban parks to some extent. However, at the same time, park design should also aim to provide good amenities to fulfil human needs and provide recreational spaces.

A surprising finding was that Hangzhou residents valued species richness significantly more than maintenance when making trade-offs. While residents preferred higher maintenance levels in parks (as utility values showed), the significantly stronger preference for species richness than for maintenance indicated that the Hangzhou public would be willing to accept or at least tolerate low-maintenance levels if the park was very biodiverse. This finding, however, was not confirmed in Shanghai, which limits the possibility of generalisation. Shanghai residents were more attentive to the neatness of a park than to

species richness, echoing previous research (Bertram and Rehdanz, 2015; Madureira *et al.*, 2018) that showed that maintenance/neatness was more important than biodiversity in urban parks/green spaces. Nassauer (1995) noted that the desire for neatness indicates a deep pervasive cultural norm of care for landscapes, and neatness is a strong predictor of aesthetic attractiveness, especially in the context of urban environments or everyday landscapes closely associated with human activities. Neatness may be more rapidly experienced than ecological functions and biodiversity, especially by lay people (Gobster *et al.*, 2007). Compared with biodiversity, a scientific concept, people may be more familiar with the cultural concept of aesthetics and, in particular, neatness. Jim and Chen (2006b) also found that cleanliness and beautiful views were the most important reasons for residents' use of UGSs in Guangzhou.

The difference of public trade-offs between maintenance/neatness and species richness in the two cities could be related to the differences in respondents' everyday experience of the living environment that has resulted from the landscape histories of the two cities. Shanghai has a long tradition of Westernisation in its urban landscapes, which has introduced large-scale mown lawns, well laid out planting, and recreational facilities into local residents' everyday landscape experience that could influence their preferences. Back to the 1860s, Waitan Park (also known as Bund Garden, now Huangpu Park), the first public park in China, was opened in Shanghai's International Settlement and it applied the picturesque-gardenesque style (Chen, 2013; Yang *et al.*, 2019a). Similar Western-style manicured parks were built later in Shanghai, such as Gujiazhai Park (now Fuxing Park) and Jessfield Park (now Zhongshan Park). Since the 1980s, large tracts of Shanghai's natural ecosystems have been cleared for urbanisation and manicured landscape creation (e.g. Century Park, Lujiazui Green Space), with highly-maintained lawns and landscapes

becoming a symbol of modernity and wealth (Yang *et al.*, 2019a). In contrast, Hangzhou has a stronger tradition of conserving indigenous, wild ecosystems and integrating them into UGSs (sometimes use classical garden ecological design strategies). For example, many biodiverse woodlands and lower mountains in the vicinity of West Lake, such as Beigaofeng and Nangaofeng, have been designated as wild UGSs.

Residents of Shanghai highly valued good facilities in parks, attaching the greatest importance to this attribute and considering it significantly more important than species richness in trade-offs. Shanghai residents' emphasis on facilities in parks aligns with several previous studies (Jim and Chen, 2006b; Aspinall *et al.*, 2010) reporting the importance of amenities in UGSs. It also confirms the finding from the focus groups, which showed that the factor of facilities was the most frequently mentioned environmental aspect that determined the attractiveness of urban parks (Section 5.2). In interviews, Shanghai's residents also talked about good and convenient facility provision in local parks and the user-friendly recreational services they had experienced, thereby motivating them to be more attentive to the aspect of facilities in parks. These residents appeared to value what they already have and, to a certain degree, showed signs of self-convincing. Shanghai is a developed and large city with a long history in China in terms of providing modern, manicured parks that contain various recreational elements and facilities (e.g. sports facilities, picnic areas, play equipment, seats, etc.). For instance, the first Chinese public park created in Shanghai in the 1860s (i.e. Waitan Park) featured different amenities such as chairs and a modern gazebo for music concerts. Other Shanghai parks built later (e.g. Luxun Park, Century Park) also contain various facilities and thus function as places for a variety of activities, including sports, wedding, playing, barbecue, etc. Jim and Chen (2006a) found that residents of Guangzhou, another highly developed Chinese city, cared more about UGSs'

function as recreational venues than as wildlife habitats and species conservation. Evidence indicated that affluent cities with higher incomes had more convenient facilities in parks (Rigolon, Browning and Jennings, 2018), and such contextual characteristic may lead residents in developed cities to care more about parks' aspects relevant in their lives, i.e. convenience and activities that can be afforded by the provision of facilities.

Hangzhou and Shanghai respondents preferred higher species richness, but this should not compromise amenities. This is in line with the concept of “harmony” behind the “oneness with nature” philosophy in Chinese traditional culture. “Harmony” emphasises the balance and coexistence of human and nature rather than pure nature worship (Han, 2006; Zhu, 2013). Natural elements are appreciated; the artificial elements such as facilities signify a safe, livable environment that meets human needs, and they are equally and may be more important than natural elements. This attitude is reflected in the dialectic design principle of “from nature but beyond nature” in Chinese gardening.

Where the biodiversity-friendly approach is to be implemented within future park developments in Hangzhou and Shanghai, good facility design and provision is important to accommodate residents' demands. However, as reviewed in Section 2.5.3 on the relationship between real biodiversity and facilities/recreation, these two goals can be mutually incompatible (e.g. Ballantyne and Pickering, 2015). Ives and Kelly (2016) discussed some potential strategies to mitigate possible conflict between biodiversity and amenities. Zoning – that is, dividing parks into zones with different roles, such as biodiversity or recreation – can be introduced as a potential strategy. This was also suggested by the professionals during the interviews. Wang *et al.* (2021) suggested the zoning approach of developing core biodiversity conservation zones and creating surrounding recreational zones with different

facilities. It is also important to design facilities according to ecological principles. The interviews revealed that ecology-based recreational facilities, such as bird houses and wildlife feeders (Nassauer, 1995), were welcomed. In uncharismatic but biodiverse areas, small-scale but visible and recognisable, carefully placed facilities may help enhance the areas' amenity, as applied in Melbourne's urban grasslands (Ives and Kelly, 2016). Increasing the complexity of the structure of plant communities and using more native species in high-amenity areas may assist in raising the biodiversity value (Ives and Kelly, 2016).

8.4 Research question 3: What are the interactions between public preferences for biodiversity and for other park attributes?

One notable finding from conjoint analysis was that in both cities, those who preferred a species-rich condition of parks were also more likely to prefer a low-intensive, near-natural maintenance manner. This might be explained by respondents' consciousness about a possible complementary relationship between real biodiversity and reduced maintenance intensity in urban parks (Rudolph *et al.*, 2017; Müller *et al.*, 2018), as summarised in the literature review (Section 2.5.1). The stereotype that respondents had in mind seems in line with such potential relationship in reality. However, the relationship as revealed in conjoint analysis was only partially confirmed by the semi-structured interviews. While some interviewees who exhibited an appreciation for the species-rich condition indicated that low-maintenance was beneficial for retaining wildlife habitats due to limited human interference, other interviewees who preferred the species-rich condition claimed that a high maintenance level (neatness/care) was essential to ensure the ecological health of parks. While the literature review in this study revealed that the majority of the existing studies reported that the reduced maintenance intensity of UGSs was linked

with higher levels of biodiversity, this research also acknowledges that the relationship between biodiversity and maintenance is quite complex and may depend on habitat types and specific maintenance work (e.g. Cheng *et al.*, 2022).

The findings from conjoint analysis also revealed that residents in both Hangzhou and Shanghai who indicated a higher preference for the species-rich setting were more likely to prefer fewer artificial facilities. This echoes a cross-country comparison study (Chen *et al.*, 2018) reporting that both Guangzhou's and Brussels' residents who were inclined to have rich biodiversity in an urban riverside green space were more likely to have a lower preference for the provision of amenities. In this study, although in general, there was the bigger picture that residents of both cities highly prioritised and valued the aspect of facilities in parks, it seems fewer artificial facility situation was more attractive to individuals that highly preferred biodiversity, according to the results from conjoint analysis. Such a preference interaction can be linked to the possibly competing relationship between biodiversity and amenities, as outlined in the literature review (Section 2.5.3). However, the interviews did not fully support the findings from conjoint analysis but elicited more detailed responses in terms of preference interactions between biodiversity and facilities. Many interviewees who preferred the species-rich condition indicated their preferences for good supporting facilities, such as toilets, bins, benches, footpaths and signs, whereas entertainment venues or sports facilities mattered less to them.

8.5 Research question 4: How does the public perceive wild and traditional parks?

Regarding public perceptions of wild and traditional parks, five main topics were

identified: 1) facilities, 2) flora, fauna and restorative nature, 3) maintenance and aesthetic value, 4) safety and 5) place attachment.

8.5.1 Facilities

In both cities, the topic of facilities was often mentioned in the focus groups and interviews with residents when they were asked about their experiences with wild and traditional parks. This frequent reference to facilities reflected the strong attention respondents paid to the park attribute of facilities, as revealed by conjoint analysis. The joint results of the focus groups, interviews and the questionnaire (related questions asked in the conjoint questionnaire) indicated that, overall, facilities in wild parks were perceived more negative compared with those in traditional parks. Wild parks were generally perceived as lacking diverse facilities, including recreation facilities and venues such as open spaces for picnic and play facilities for children, as well as sufficient supporting facilities such as resting facilities with shelters and more paths. Such concerns were also raised by previous studies in both Global North and South contexts. For instance, Manyani, Shackleton and Cocks (2021) revealed that the lack of recreational facilities was an important deterrent against visiting wild UGSs among residents in South Africa. Ward Thompson *et al.* (2004) found that one of the users' dislikes about woodlands in Central Scotland was the lack of facilities, including toilets and good paths. Regarding paths, Jorgensen, Hitchmough and Dunnett (2007) found that there was an absence of a clear hierarchy of footpath systems in the ecological woodland style practised in Birchwood.

Several focus group participants in Hangzhou specifically complained about restricted access/use in some areas in Jiangyangfan Eco-Park. The designer of Jiangyangfan Eco-Park prioritised the goal of biodiversity conservation,

thereby limiting human recreational activities to one boardwalk to minimise the potential impact on biodiversity imposed by recreational uses (Lin and Wang, 2019). Indeed, this approach was also adopted by other Chinese wild parks, such as Beijing's Guangyanggu Forest Park, where people's activities are limited to gravel roads and one wooden platform, which take up only 8 % of the total park area (Wang *et al.*, 2021). However, such an eco-centric approach (Wang, 2021a) can be controversial from a park user's perspective and may influence a park's readability. Readability is important for the enjoyment of a park. Users may not understand the latent ecological purposes behind restricted access/use without additional information. In such a situation, information boards introducing ecological purposes might compensate for the lack of access. Gilles Clement's Derborence Island in Parc Henri Matisse in is intentionally inaccessible to permit ecological succession without any human interference. While the park raised difficulties in readability and public comprehension due to its inaccessibility and concrete walls (Gandy, 2013a), an information plaque was installed, stating that the park is inaccessible on ecological grounds and including an invitation for visitors to reflect on the urban–nature relationship. In the words of Gandy:

“The relationship between the potential acceptance of urban wilderness and opportunities for public access, education and other forms of involvement is now widely recognized as a key element in successful attempts to create “wild” urban spaces.” (Gandy, 2013a, p. 270)

By contrast, facilities in traditional parks were appreciated because there were a variety of recreation and supporting amenities and services that could support users' needs. Ward Thompson *et al.* (2004) found that the activities people undertaken in woodlands were influenced by the availability of facilities. As revealed by the focus groups in this research, participants' activities in the two park types reflected the potentially reduced functionality of wild parks compared with traditional parks. Traditional parks were often actively used for exercising, picnicking, playing (especially for children), sports/ball games and similar

activities, whereas wild parks were more passively used for a narrow range of activities, such as walking and sitting. Furthermore, due to their dense wooded areas, wild parks were perceived as having limited open fields for activities. This finding is close to that of the study by Bjerke *et al.* (2006), who reported that wild UGSs with dense vegetation compromised the perceived appropriateness for recreation.

8.5.2 Flora, fauna and restorative nature

8.5.2.1 Flora and fauna

Data from each research method ²² indicated that the majority of the participants in Hangzhou and Shanghai recognised that wild parks had more species of flora and fauna than traditional parks. Several studies found that the public could reasonably and accurately perceive species richness (Fuller *et al.*, 2007; Qiu, Lindberg and Nielsen, 2013; Gao *et al.*, 2019). Words and phrases such as “higher greenery rate,” “various wildlife and bird species,” “had woodlands and wetlands,” and “more natural and peaceful” were used by participants to explain why they considered wild parks species richer. As expected, plants and animals tended to be used by the public as biodiversity indicators (Fuller *et al.*, 2007; Qiu, Lindberg and Nielsen, 2013; Southon *et al.*, 2018), and people’s experiences with biodiversity were often related to words with biological content and associated with nature or wilderness (Gyllin and Grahn, 2005).

In Hangzhou’s focus groups, many participants talked about the woodlands in Jiangyangfan Eco-Park with both positive (e.g. cleaning the air, cooling the environment, and making participants relaxed) and negative evaluations

²² Apart from the focus groups and interviews, data from the questionnaire in the conjoint survey provided additional information for this question.

(unattractive, dull, and not suitable for recreation and active use). The public's ambivalent attitude towards urban woodlands has been reported by previous Western studies (Burgess, Harrison and Limb, 1988; Burgess, 1995; Jorgensen, Hitchmough and Dunnett, 2007). Interestingly, interviewees recognised the biodiversity potential of USV and dead wood (Del Tredici, 2010; Sikorska *et al.*, 2021) and mentioned their role in enriching soil and supporting other living things, such as fungi and mushrooms. Interviewees did not always perceive spontaneous flora as "weeds" and they were not opposed to their presence in urban parks. Indeed, the appreciation of USV in Chinese culture can be traced back to "The Book of Songs," an anthology of ancient Chinese poetry, in which wild plants are described with symbolic meanings/human spirits, and romantic scenes of people interacting with wild plants are extensively portrayed (Li *et al.*, 2019b). For example, Shepherd's purse (*Capsella bursa-pastoris*) is regarded as implying a man with moral integrity (Li *et al.*, 2019b). In terms of other studies, the research by Weber, Kowarik and Säumel (2014) in two German cities similarly found that respondents showed a surprisingly high level of awareness of the ecosystem services provided by roadside USV. More and more studies from different cultural regions including Germany (Weber, Kowarik and Säumel, 2014), the UK (Bell, Ward Thompson and Travlou, 2003), Australia and Japan (Rupprecht *et al.*, 2015) have revealed the attractiveness of USV to urban residents, although associated problems (e.g. litter, lack of maintenance) were also acknowledged. Gilles Clement's *friche apprivoisée* (Clément, 1985) indicates the biodiversity potential of less controlled, marginal wastelands with USV that are species rich, and he has applied his appreciation of USV to several landscape projects. In China, USV instead of lawns has been suggested in the Sponge City programme to create rainwater reservoirs and wildlife habitats (Li, 2016).

The focus groups and interviews further found that lawns were generally

appreciated and were an important attraction factor of traditional parks, whereas the negative ecological impacts of lawns (e.g. low species diversity, intensive water use, application of pesticides/herbicides, etc.) were not raised by participants. Lawns, as can be seen in many Chinese traditional parks, provide open, recreational spaces where residents can picnic, meet up with friends and family, and actively engage in sports, building social cohesion and connection. This corresponds to the study by Ignatieva *et al.* (2017) in Sweden, who found that lawns were appreciated as important venues for enjoying greenery and having outdoor activities. While Yang *et al.* (2019b) found lawns in Xi'an, China were mostly used for passive activities such as sitting and resting, this study found that residents in Hangzhou and Shanghai also used lawns for active use, such as playing ball games. The appreciation of lawns in the Chinese context might be explained by the acceptance of the Western picturesque-gardenesque, lawn-dominated park landscapes. While there is an absence of the use of lawns in Chinese gardening culture, lawns have been introduced and extensively used in Chinese urban landscapes as a symbol of westernisation, modernity, and prosperity since the middle of the 19th century (Yang *et al.*, 2019a). It is alarming that the negative ecological impacts of lawns were not recognised by participants in this study, and some even considered lawns to be natural and ecological due to their green appearance, which does not correspond to the reality. Improving public awareness and understanding of lawns and their impacts on urban ecosystems through formal or informal education channels is thus necessary in China.

Wildlife at wild park sites was largely appreciated in the focus group discussions, whereas there were few references to wildlife at traditional park sites. An innate tendency towards wildlife is recognised in the *biophilia hypothesis*, stating people's predisposition and affiliation with wildlife and nature (Kellert and Wilson, 1993). Humans may have species-specific attitudes towards wildlife.

Fears can be triggered by large predators, yet wildlife such as birds, squirrels or butterflies may be considered favourable providing they are not harmful to people (Prokop and Randler, 2018; Castillo-Huitrón *et al.*, 2020). In the wild parks selected for this research, most wildlife that appeared are animals such as birds, butterflies, waterfowl and squirrels, which are generally not considered threatening to people. This may explain why few participants talked about feelings of fear/anxiety regarding wildlife at the wild park sites. However, during the interviews, when interviewees discussed biodiversity in general, concerns about potential human–wildlife conflicts emerged and preferences for plant diversity over fauna diversity were expressed.

8.5.2.2 Restorative experiences

In the focus groups, many participants' experiences with the wild park sites were related to the restorative power of nature. Although this research did not investigate the Attention Restoration Theory (ART) (Kaplan and Kaplan, 1989) directly, it seems some qualities of the wild park sites experienced by participants were associated with some of the four components of ART (*fascination, being away, extent, and compatibility*). Participants' descriptions of experiences of Jiangyangfan Eco-Park and Houtan Wetland Park indicated *fascination*: many features of the two wild park sites effortlessly captured their attention and they were considered interesting – from the different wildlife species, natural trees, obvious seasonal changes to the wonderland-like environment after the rain. The peaceful and natural environments afforded the participants opportunities to escape the routine of life, feel immersed in the environment, and get a sense of release and relief, which all contributed to a sense of *being away* and *extent*. Experiences related to *compatibility*, however, were not strongly expressed, since many participants felt the wild park sites did not support different types of activities. Therefore, not all the identified wild park experiences fit into the four components of ART.

The overall restoration potential of wild UGSs, from woodlands (Ward Thompson *et al.*, 2004; Jorgensen, Hitchmough and Dunnett, 2007) to wild/naturalistic parks (Ozguner and Kendle, 2006) and plantings (Hoyle, Hitchmough and Jorgensen, 2017) to wildscapes at work (Colley, Brown and Montarzino, 2016), has been documented by previous studies. Findings on the question of restorative impacts between wild/naturalistic and traditional/ornamental green spaces were often inconsistent, as shown by previous research (Laumann, Gärling and Stormark, 2001; White *et al.*, 2013; Van den Berg, Jorgensen and Wilson, 2014; Tyrväinen *et al.*, 2014). In the focus groups, the restorative potential of traditional parks was not discussed much.

8.5.3 Maintenance and aesthetic value

Data from the three methods indicated that residents of both Hangzhou and Shanghai, in general, considered the maintenance intensity of wild parks to be lower than that of traditional parks. However, in focus groups, not all participants found the less intensive, near-natural maintenance manner negative. For some, this level of maintenance permitted cities to have natural spaces for the conservation of wildlife as well as connecting people to nature, confirming the findings from a German Nature Awareness Study (Kowarik, 2018), which showed that the majority of the respondents felt cities should have spaces where natural processes were allowed.

This study showed that residents in both cities considered traditional parks to be more aesthetically attractive than wild parks. Interestingly, participants in the focus groups and the interviews used the words “picturesque” (风景如画) and “looks like a picture” to describe traditional parks, and they talked about the perceived beautiful views of lawns with some trees. Certainly, “picturesque” is a Britain-based aesthetic notion. However, the word “picturesque” was also

used by Chinese participants in this research and was described with features of savanna-like settings (lawns, scattered trees). Several scholars (Guan, 2016; Guan and Zhu, 2016; Gu, 2016) suggested that while picturesque in the British tradition is closely associated with romantic landscape paintings and savanna landscapes, the Chinese picturesque tradition is inspired by the mountain–water model in Chinese classical landscape paintings and classical gardens. However, in this research, it seems participants’ ideas of picturesque were more relevant to lawns and clumps of trees, i.e. the typical elements of a savanna-like setting, rather than the Chinese mountain–water model. Westernisation in China has resulted in a preference towards the paradigm of neat lawns with some trees in the British picturesque tradition, despite distinct cultural differences (Ignatieva, 2018; Yang *et al.*, 2019b).

A notable finding was the general positive attitude towards wetlands, including their aesthetic beauty. The metaphor of urban lungs was used by participants to describe wetlands in terms of their functions of air purification and microclimate regulation. While environmental philosophers described wetlands as *unscenic* landscapes (Saito, 1998) and having a *difficult beauty* to appreciate (Carlson, 1999), it is speculated that the broad and intensive publicity about the ecological function of wetlands via social media in China today seems to change people’s appreciation (Carlson, 1995; Budd, 2008).

8.5.4 Safety

In focus groups, there were only a few references to experiences of a sense of insecurity in Jiangyangfan Eco-Park. As for the traditional park sites, participants in both cities felt safe and did not have any safety concerns in this park type. The semi-structured interviews had inconsistent findings. While the traditional park was perceived safe, a considerable number of the women

interviewees felt it would be unsafe to visit the wild park alone. While previous studies revealed that people had a sense of insecurity when in wild UGSs (e.g. Jorgensen, Hitchmough and Dunnett, 2007), the research by Ozguner and Kendle (2006) revealed that respondents felt safe in Endcliffe Park, a naturalistic urban park in Sheffield.

The inconsistency in results regarding the safety issue with wild parks, as revealed by the focus groups and semi-structured interviews, may be attributed to the different approaches used to elicit responses (actual sites vs. photos). For the focus groups, actual wild park sites were used, and I tried to understand participants' experiences in real places. In the interviews, photographs were used to show the wild park style, and interviewees' responses may have been only applicable to the photographs. However, all focus group participants had visited the selected wild park sites before, and some of them were familiar with the sites, which may have increased their sense of security.

8.5.5 Place attachment

This study found that wild parks often evoked individuals' positive memories/past experiences, which can be linked to the concept of place attachment, described as "the emotional and psychological connections between people and place" (Walker and Ryan, 2008, p. 141), whereas no place attachment-related references about traditional parks emerged. This is consistent with a study that found place attachment in relation to woodland and meadow planting but not in relation to more formal, arboretum-style planting (Hoyle, 2015).

The focus groups and interviews showed that the wild park style evoked some residents' childhood experiences when they lived in the countryside. However,

conjoint analysis found no significant differences regarding preferences for the wild park scenario between respondents raised in rural and urban areas. Previous studies have produced mixed evidence on the association between childhood nature experience and green space preference and visitation as adults. On one hand, UK studies found that childhood experience of natural spaces was important for children development (Bell, Ward Thompson and Travlou, 2003) and could predict adult patterns of natural and wild space use (Ward Thompson, Aspinall and Montarzino, 2008). However, a study from New Zealand (van Heezik *et al.*, 2021) found no evidence to support this prediction. Many factors contribute to the prediction of an individual's green space preferences and usage in adulthood. Adult appreciation of wild spaces may stem from a deep attachment to nature that develops during childhood rather than simply general exposure to nature during this period (van Heezik *et al.*, 2021).

The older focus group participants were pleased that original wildscapes, such as wetlands and ponds, that evoked memories of happy childhood times spent in these landscapes, were retained in wild parks. This is in line with the study by Jorgensen and Anthopoulou (2007), which revealed older people's affection for urban woodlands for their connection with the past. Older participants in Shanghai's focus groups highly valued the crops planted in Houtan Wetland Park, and named some crops such as paddy rice, sunflowers, wheat, etc. Agricultural plants referenced the park site's original farming past and helped these older participants to establish a connection with their agricultural past as farmers. China is mostly an agricultural society in the past, and many older group members in this study have experienced traditional agricultural production, which may help shape their appreciation of agricultural landscapes in this wild park. Interestingly, there were no references to wildscapes and crops among younger adults. One interpretation is that conventional farming is no

longer that common in China due to high-speed urbanisation, and many Chinese younger adults have limited experiences of agriculture and farming. As a result, agricultural landscapes remain as a memory for the older generation, evoking nostalgic scenery in their hearts.

While wildscapes and farmlands have biodiversity potential (Del Tredici, 2010; Kowarik, 2011; Sikorska *et al.*, 2021), they also hold Chinese people's past experiences and memories, especially for older people, meaning that they are also valuable from a cultural perspective. Chinese people's attachment to their agriculture past is also reflected in the recent spontaneous urban agriculture where people have transformed lawns and leftover lands near their neighbourhoods into community gardens. These gardens contain a variety of vegetation and native plants, which can support urban biodiversity, provide green space experiences, and re-establish people's connection with agriculture. Some landscape projects in China (e.g. Houtan Wetland Park, Shenyang Architectural University Rice Campus designed by Turenscape) have reintroduced traditional farming elements into urban landscapes to respect Chinese traditions. These projects emphasise the value of traditional vernacular landscapes, inspiring Chinese landscape design to rediscover historical "art of survival" used by ancient Chinese to respond to environmental challenges and to create safe, beautiful, and meaningful landscapes (Yu and Padua, 2006).

8.6 Research question 5: Between the wild and traditional park styles, which one is preferred by the public and why?

This study found evidence that, in general, residents of both cities showed a greater preference for the traditional park style. This echoes some studies (Zheng, Zhang and Chen, 2011; Hofmann *et al.*, 2012; Qiu, Lindberg and

Nielsen, 2013; Khew, Yokohari and Tanaka, 2014), but differs with studies that identified that residents appreciated wilder UGSs (Kaplan, 2007; Caula, Hvenegaard and Marty, 2009; Hoyle, Hitchmough and Jorgensen, 2017; Harris *et al.*, 2018). The interviews revealed that the traditional style was preferred because it was beautiful, functional, well maintained, familiar and had more open areas for activities. Qiu, Lindberg and Nielsen (2013) argued that the conventional, ornamental style of UGSs is often valued by urban residents, who have been accustomed to recreational, clean UGSs with mown grass and trees and flowerbeds. The biological/evolutionary approach of landscape perception and preference (Appleton, 1975; Kaplan and Kaplan, 1989; Orians and Heerwagen, 1992) has been developed to explain the popularity of such style.

Notably, the result of preferences for the traditional style seemingly contradicted the previous finding that residents preferred higher biodiversity levels in parks. Although higher levels of biodiversity, described as species richness in the conjoint questionnaire, were preferred by the public, wild parks were less preferable than traditional parks. This may indicate that preferences for biodiversity at the species level do not necessarily represent preferences for wild parks at a larger spatial level, that is, the ecosystem level. In this study, other features of wild parks, such as low maintenance and few recreation amenities, were not that attractive (as revealed in utility value) and may counteract the positive evaluation of biodiversity. For wild UGSs, traces of neglect and litter may mask positive biodiversity impacts (Nassauer, 1995; Fischer *et al.*, 2018). Khew, Yokohari and Tanaka (2014) and Fischer *et al.* (2020) also found that residents favoured conventional, manicured green spaces but also expressed support and wishes for urban biodiversity.

There were responses describing the impact of season/visit purposes on preferences between wild and traditional park sites in the focus groups. For

instance, some participants preferred traditional parks in spring because of the blooming of ornamental flowers there, whereas they preferred wild parks in summer due to its lush shade trees and woodlands. In addition to season, participants also mentioned how their preferences depended on visit purposes. Participants preferred the traditional park site to have activities or meetings with family and friends, whereas the wild park site was considered more suitable for solitude and seemed more suited to natural, rural areas. Spirn (1984) noted that how wild, successional vegetation is perceived may depend on the context. Dense woodlands can be perceived as pleasantly natural in nature reserves but as signs of abandonment in populated cities. Yang *et al.* (2019b) found that the introduction of biodiverse alternative lawns, namely, diverse herbaceous plant species, in Xi'an, was not appreciated in cities but could be accepted in suburban areas.

While conjoint analysis and interviews clearly showed a preference for traditional over wild parks among Hangzhou and Shanghai residents, the focus groups did not reveal a clear pattern regarding preferences between the two park styles. Yet richer and more diverse responses were identified in the focus groups, using actual park sites for discussions. The sampling bias in Shanghai's focus groups is acknowledged: most older participants lived near Houtan Wetland Park and used this park more than Qiantan Recreation Park, despite my efforts to recruit older Shanghai participants who had similar access to both two park sites (to eliminate the possible effect of distance on preferences). The easier accessibility of Houtan Wetland Park for these participants and familiarity with this park may have influenced their preferences, posing a limitation on the focus group results regarding park style preferences in Shanghai. This study is more confident about the results on park style preferences from the conjoint analysis (which involved large sample sizes) and the interviews.

8.7 Research question 6: What environmental interventions would enhance public preferences for wild parks?

All research methods revealed that preferences for wild parks in both cities would be enhanced by improving maintenance levels, corresponding with many studies reporting the importance of maintenance for the appreciation of wild UGSs (e.g. Hofmann *et al.*, 2012; Ignatieva *et al.*, 2017). Placing biodiverse ecosystems in cities can be challenging, and one of the challenges is that the appearance of these ecosystems does not always align with the neat, ornamental character of conventional landscape beauty. Cues to care (CTC), proposed by Nassauer (1995), suggested the importance of visible and recognisable elements that indicate human care for messy ecosystems. Some CTC as solutions for American suburban yards were demonstrated by this research to indicate/show maintenance in Chinese park contexts, including mown turf, flowering plants and trees, neatness and order, wildlife feeders and houses and signs that describe the environmental benefits of the land. However, improving maintenance levels of wild parks to increase social preferences would need to be done discreetly to minimise possible negative impacts on biodiversity. The literature shows that maintenance and biodiversity conservation do not always easily exist together (Section 2.5.1). Neatness in wild parks was suggested by interviewees on a small scale, for example, in intensively used areas, rather than on a large scale.

In both cities, the conjoint analysis found that adding more facilities would significantly improve preferences for wild parks. The focus groups and interviews suggested more supporting facilities and recreation/play facilities, such as small squares for group folk dancing, play facilities for children, bird houses and wildlife feeding venues and an environmental interpretive system

with facilities and informative interpretive signs. Nassauer (1995) noted that people may not be able to identify the particular habitat for the wildlife species they admire and may not consider the possibly messy or brush quality of the habitat attractive. However, they do link visible wildlife houses and feeding venues with the wildlife species they appreciate. Both Carlson (1995) and Budd (2008) argued the importance of knowledge in aesthetic appreciation. The incorporation of an environmental interpretive system in wild parks might be important to increase public understanding and acceptance of biodiversity and wild UGSs. The case of Tanghe Ribbon Park in Qinhuangdao, China, designed by Turenscape, provides a good example of how incorporating facilities in a wild UGS can make the site coexist with biodiversity and is also welcomed by communities (Li and Nassauer, 2021). In this project, by adding a wandering boardwalk lined with a red bench, the wild ecosystem becomes more accessible and usable for recreation, which can alter people's experiences in this wild environment.

Conjoint analysis found that decreasing woodland density to the semi-open state, but not the wide, open condition, in wild parks would significantly enhance public preferences for wild parks. Preferences for semi-openness have been asserted by many landscape preference theories discussed in this thesis, for example, *prospect-refuge theory* (Appleton, 1975), *the savannah theory* (Orians and Heerwagen, 1992) and *preference matrix* (Kaplan and Kaplan, 1989). From a practical perspective, decreasing woodland density in wild parks to the semi-open condition can make people feel safer and provide more open spaces for recreation and activities (Bjerke *et al.*, 2006). However, it should be noted that dense, naturalistic woodlands may contain old trees, which are valuable natural assets for biodiversity that should not be removed (Lis and Iwankowski, 2021). In China, trees that are more than 100 years old are named heritage trees by the Chinese government (National Afforestation Committee

and National Forestry Administration, 2001), and they are highly valued by the general public. For instance, some Chinese residents of the mid-subtropical zone have maintained their deep-rooted traditions of nature worship, as well as their customs of protecting *Feng Shui* heritage trees and forests in and around their communities. In terms of enhancing the feeling of safety, appropriate management for dense woodlands to keep them appearing cared for may be more appropriate than removing trees (Lis and Iwankowski, 2021). Certain dark, wooded areas need to be maintained to keep them more open (Ward Thompson *et al.*, 2004), which is also conducive to permitting light penetration for the healthy growth of understorey. Furthermore, creating a mosaic of different woodland types, representing varying degrees of density, could help balance residents' expectations and biodiversity conservation/enhancement.

Other preferable environmental interventions include adding more flowering plants, introducing more interactive activities and public events, and eco-revelatory design to reveal ecological phenomena that is previously unnoticed (for example, rainwater gardens to display the hydrological processes and working of stormwater management systems). Different theories have been proposed to interpret preferences for colourful flowers. From an evolutionary perspective, flowers imply a resource-rich environment necessary for human survival (Heerwagen and Orians, 1993). In some cultures, flowers also indicate cues to care (CTC) that imply evidence of human intention in landscapes (Nassauer, 1995). In China, recently there has been an increased interest in flowers, either for floral home decoration or appreciation in outdoor green spaces. This fact might also have influenced participants' attention to the use of flowers in wild parks. Interestingly, respondents preferred delicate-coloured flowers, despite that bright colours such as red and yellow are important in Chinese culture as they are associated with joy and happiness. Regarding interactive activities and public events, they offer people opportunities to have

vibrant interactions with wild parks. It is important to provide people with not only a visual experience but also more experiential, multi-sensory perceptual engagement. This could be linked with Berleant's aesthetics of engagement (Berleant, 1992). Eco-revelatory design has been promoted by recent stormwater projects in China (e.g. rainwater gardens designed by UP+S Design). Some elements such as swales, detention ponds, green roofs, along with interpretive signs, can be further promoted in future wild parks. While the above-mentioned environmental interventions were suggested, more research is needed to explore how and at what scale these interventions should be implemented in wild parks for the purpose of balancing biodiversity conservation and social preferences.

8.8 Research question 7: How do preferences for park biodiversity and for the wild park style vary between different sociocultural groups among the public, and between the public and professionals?

8.8.1 The public versus the professionals

Conjoint analysis found significant differences in preferences for park biodiversity between the public and the professionals in Shanghai as well as in the whole sample when the two cities were considered as a whole. The study found professionals valued the attribute biodiversity significantly more than the general public. Expertise or engagement with environmental issues has been cited as an important factor of developing environmental and conservation awareness and concerns. For example, Keane *et al.* (2011) revealed those engaged in tourism and local forest management were more likely to correctly classify protected species. Qiu, Lindberg and Nielsen (2013) found ecology

experts showed a greater preference for certain aspects of biodiversity such as dead wood. Expertise or engagement with environmental issues is related the factor of knowledge/interest in nature/park/ecology. The study found that public respondents with knowledge/interest in nature/parks/ecology in Shanghai and in the whole public sample valued biodiversity significantly more than those without. However, this was not found in Hangzhou. Unfortunately, due to the low number of public respondents with knowledge/interest in nature/parks/ecology participating in the conjoint questionnaire, the knowledge/interest-related finding may not be that reliable.

In addition, in both cities, while the public preferred the traditional park style over the wild style, professionals showed a greater preference for the wild style and had a significantly higher preference for the wild park style compared with the public. Such difference was also revealed by other studies (e.g. Zheng, Zhang and Chen, 2011; Hofmann *et al.*, 2012). Related ecology/landscape expertise may play a positive role as a mediating variable in shaping this difference, and the professionals were probably better informed about biodiversity benefits associated with some characteristics of wild parks, for example, the less-manicured approach, than the public. However, such causal relationship was not tested in this research and future research could explore this issue.

8.8.2 Education and city of residence

The study found there were significant differences in the valuation of the attribute biodiversity across education groups in Shanghai: those with a postgraduate degree or higher education valued the attribute biodiversity significantly more than those with high school or lower education. This echoes previous studies that indicated the importance of education for the appreciation

of biodiversity and the development of a more eco-centric view of the human–nature relationship (De Groot and Van Den Born, 2003; Fischer *et al.*, 2018). The finding that education had a bearing on the valuation of biodiversity in parks as identified in Shanghai seems to defy biophilia, which argues an innate affection for plants and animal species (Kellert and Wilson, 1993). However, significant differences regarding public preferences for biodiversity between education groups were not identified in Hangzhou, thereby limiting the possibility of generalisation. Further research could test the tension between the innate, biophilia preference for biodiversity and the education-driven preference to gain a more complete picture on this issue.

Furthermore, the factor of city of residence was a strong predictor for the valuation of biodiversity: the public respondents in Hangzhou valued biodiversity significantly more than their peers in Shanghai. As there is evidence that people in wealthier areas cared more about the environment and biodiversity (Franzen and Vogl, 2013), this research expected that Shanghai residents would have a stronger appreciation of biodiversity than Hangzhou residents as a result of the more urbanised and developed condition of Shanghai. However, this was not confirmed. The interviews revealed that this surprising finding might be associated with the difference in public access/exposure to biodiversity between the two cities. Compared with Shanghai residents, Hangzhou residents might have relatively more opportunity to encounter urban biodiversity in their daily lives because of Hangzhou's rich natural resources (e.g. West Lake, Xi'xi Wetland, Qiantang River and the Grand Canal) and biodiverse UGSs. Yan and Yang (2017) showed that Hangzhou has higher levels of diversity in woody plant species and greater tree and ground vegetation cover than Shanghai. However, these facts contradict the notion of the *luxury effect* (Hope *et al.*, 2003) indicting that urban areas with higher socioeconomic status tend to have higher levels of

plant diversity.

8.9 Evaluation of research methods, limitations, and future research

The study was conducted in Hangzhou and Shanghai, and the findings generated from this research were specific to the two selected cities' contexts, limiting the extent to which they can be generalised to other cities or contexts. The research findings can be affected by the two cities' socio-economic peculiarities, physical environmental/climate conditions, landscape/park contexts, etc. Both Hangzhou and Shanghai are large eastern Chinese cities with fast economic development. The climate in the two eastern cities supports the plant palette, and Hangzhou has extensive natural woodland and wetland resources (Du and Huang, 2018). The landscape context of the two cities has a relatively long gardening history and advanced urban greening. This thesis can, therefore, provide implications for the two cities' local policies and practices. However, it's difficult to tell from the data about social perceptions of urban biodiversity and wild park style in other Chinese cities. China is a country where regional differences can be strong due to its environmental and socio-economic diversity. To comprehensively inform general policies and to consider the transferability of this study, it would be pertinent to extend the study to other cities across China or beyond, and alternative findings may emerge. This could also help to obtain comparable data on residents' perceptions and preferences across different contexts.

While the selected park sites in focus groups and manipulated images in interviews provided a common reference for discussions and allowed participants to relate to their own experiences, the data only provided local park-specific or image-specific insights. Participants may have different experiences

if a different set of parks/images was selected. In interviews, each park style was only represented by a single image. Further research with multiple images per park style is encouraged, e.g. five different images for one park style, and each image is randomly ordered, following the recent publication from de Val (2023). Furthermore, the possible impact of the ex-situ approach of focus groups and interviews on people's experiences of urban biodiversity and wild park style should be considered. For instance, while ex-situ interviews found participants generally showed lower preferences for the wild park style, alternative findings may result if the in-situ approach was used. Gobster (1999) notes that active engagement and real-world, multi-sensory experiences (e.g. smell, touch, visual, sound) are important for the appreciation of ecological and wilder landscapes. Future research may consider investigating in-situ experiences through, for example, on-site or go-along interviews. Social media data (e.g. georeferenced data) is recently considered effective for offering in-situ information (Chang and Olafsson, 2022) and requires further attention.

Data collection was unavoidably impacted by the COVID-19 pandemic. Despite the recruitment efforts, a sampling bias existed in terms of the recruitment of Shanghai's older focus group participants, since most of them lived near the selected wild park site (Houtan Wetland Park) and might use this park more than the traditional park site (Qiantan Recreation Park). This may have impacted their experiences and preferences; previous research found residence or familiarity had effects on landscape preferences (Kaplan and Kaplan, 1989). The conjoint survey sample within the public group is proportionate to the census of the survey districts in terms of the demographic factor of gender in both cities and age in Hangzhou, as well as residential living districts in Shanghai. However, it's important to note that the conjoint survey data collection lacked truly random sampling from the general public and ecology/landscape professionals and is thus not representative of the study

populations in general in two cities (e.g. the under-representation of middle-aged respondents in Shanghai). A large-scale survey with a comprehensive, random sampling strategy is encouraged in the future. The sample size of the professional group was small. Yet, this limitation may be mitigated by one advantage of ACBC research, that is, it can achieve relatively reliable results with a smaller sample size (Orme, 2010; Sawtooth Software Inc., 2014; Lima, 2016; Stanton, 2016; Veitch *et al.*, 2022). However, the study highlights caution when interpreting the results, especially with regard to those respondents that were under-represented.

The limitations of the conjoint analysis approach for investigating the social dimension of biodiversity in urban parks should be acknowledged. Firstly, while the text-based conjoint analysis for describing attributes and levels has benefits (see section 4.5.3), it may result in some ambiguity and inconsistencies of the three levels' descriptions of species richness (rich, moderate, and poor) envisaged by different respondents when responding to the questionnaire. Different respondents may interpret the descriptions differently from each other, leading to possible inconsistencies that may have affected the results, for instance, preferences for different levels of species richness. Evidence or pre-tests of how consistently people imagine differences in species richness is helpful to address this limitation. Future research may also use standardized images to introduce attributes and levels. Participants might have different interpretations of attributes and levels if images were used, and that alternative findings could result.

Secondly, the method of conjoint analysis has its inherent limitation that forces simplification of complex concepts such as biodiversity. In conjoint analysis, "biodiversity" was simplified as "species richness," and the conjoint findings can only be interpreted at the species richness dimension. While species richness

is an important aspect of biodiversity, it is only one of many dimensions of biodiversity, and preferences for other dimensions of biodiversity (e.g. at gene or habitat/ecosystem level) cannot be identified from the conjoint data. Existing knowledge on urban biodiversity perception and preference at the gene level is rare (Botzat, Fischer and Kowarik, 2016). Future research may address the social perspective of urban biodiversity at more than one dimension using alternative methods like opinion surveys.

Analysing the qualitative focus group data to develop key concepts as limited, distinct park attributes (used in conjoint analysis) as possible can be challenging. This is because a tension arose during the analysis between the complex and rich data yielded by focus groups and the simplification associated with limited attribute development (Coast *et al.*, 2012). Coast *et al.* (2012) note an important issue of using qualitative methods for conjoint attribute development is

“the difficulty in resolving tensions inherent in the reductiveness of condensing complex and nuanced qualitative findings into precise terms.” (Coast et al., 2012, p. 730)

Based on the analysis of the focus group results pertaining to important park aspects that residents cared about, this study finally generated five park attributes. Urban parks were then simplified as scenarios or combinations between different levels of these five attributes. This inherent simplification of parks in real-life from conjoint analysis may affect the validity of the findings to predict actual behaviours. Behaviour mapping could be used in continued study to complement the results from conjoint analysis in this study.

Some issues raised in this research could be explored further:

- 1) Environmental interventions, such as improving maintenance levels (e.g. mowing) or introducing flowers into wild parks were mentioned by

interviewees in this research. It is relevant to further explore the issue of appropriate proportion/scale of these interventions that could balance biodiversity conservation and public preferences.

- 2) A few interviewees specifically mentioned that they preferred flora diversity rather than fauna diversity in urban parks. Quantitative research on responses to different aspects of biodiversity in parks could be conducted in the future.
- 3) It would be worthwhile to extend the review of the literature (Section 2.5) on the relationship between real biodiversity and maintenance/facilities/vegetation structure in urban parks to gain a more comprehensive understanding of the biodiversity-friendly design approach.
- 4) Future research could further test the tension between the innate preference for biodiversity and the education/professional knowledge-driven preference in order to achieve a more comprehensive perspective on this issue. A solid understanding is important to rethink the role of providing related information and environmental education in guiding public attitudes and support for issues related to biodiversity and conservation.
- 5) The topic of place attachment and wildscapes in China (spontaneously raised by focus group and interview participants) is worthy of further exploration. Given the unprecedented rate of urbanisation in China, wildscapes tend to be destroyed or artificialised, eventually only existing in many Chinese people's memories.

Chapter 9: Conclusions

9.1 Conclusions and implications for practices

This research responds to the growing interest in the biodiversity-friendly approach to urban park design in China from a social perspective. By positioning the biodiversity-friendly park approach within the Chinese social context, this study focuses on three main research objectives: 1) public response to biodiversity in urban parks, 2) public perceptions of and preferences for the novel wild park style versus the traditional style and 3) preferences for park biodiversity and for the wild park style between the public's different sociocultural groups, and between the public and ecology/landscape professionals. This study adds to the relevant research on the people–biodiversity relationship in the context of urban parks by reflecting on this issue in China, where relevant studies from this country are scarce compared with the Western world (Section 3.8) (Zhong, Yang and Xue, 2021). Although China has proposed a new national plan, i.e. *Ecological Civilisation*, to focus on ecological protection and remediation, it is suggested that urbanisation and *the extinction of experience* (i.e. people risk being increasingly disconnected from nature) (Pyle, 1978; Miller, 2005) are expected to be more rapid in China and in other developing countries (United Nations, 2014; Botzat, Fischer and Kowarik, 2016). An exploration of public perceptions of biodiversity and related design approaches in China facing high-speed urbanisation would help to provide insights into the way to create socially acceptable urban policies and practices supporting biodiversity and promote their implementation to achieve long-term sustainable goals.

This study applied a mixed-method research approach consisting of focus groups (phase I), conjoint analysis (phase II) and semi-structured interviews

(phase III) in a three-phase linear manner in two Chinese cities, Hangzhou and Shanghai, with relevant output from one phase influencing the next phase. While this research mainly targeted the general public, conjoint analysis and semi-structured interviews also included ecology/landscape professionals to compare their preference with that of the public.

Research objective 1: Public response to biodiversity in urban parks

During focus group discussions and interviews, it became clear that most participants had a general feeling that the word “biodiversity” was in relation to the richness and diversity of plants and animals. However, the word was not frequently used in their daily lives. The findings showed a bigger picture that higher levels of biodiversity in terms of flora and fauna species richness in urban parks were appreciated by the public in both Hangzhou and Shanghai. This supports urban policies promoting biodiversity-friendly park development and highlights the need – and the opportunity – to incorporate biodiversity improvements into future park practices.

However, a demand for higher levels of biodiversity in parks does not mean residents value biodiversity more than other park attributes and accept the prioritisation of biodiversity conservation/enhancement in park design. Using conjoint analysis, this research further quantitatively investigated the importance of biodiversity (species richness of flora and fauna) compared with other relevant urban park attributes (i.e. facilities, woodlands, maintenance and seasonal views) identified by focus groups in phase I. The findings indicated that both biodiversity and facilities were the most important park attributes for Hangzhou residents. In Shanghai, residents considered facilities to be the most important attribute, and biodiversity assumed the fourth ranking in terms of the importance among all five attributes. In this sense, residents in both cities valued species richer flora and fauna but not at the expense of good amenities.

This suggests that biodiversity should not be the sole prioritised park design concern and that facilities should also be given great consideration. The biodiversity–amenity strategy for bringing together both biodiversity and facilities (for example, as applied in Melbourne’s urban grasslands; Ives and Kelly, 2016) should be promoted in China’s future urban park practices. Landscape designers should explore more ways to promote the coexistence of biodiversity and facilities, in spite of the possible disjuncture between the two (Section 2.5.3; e.g. Ballantyne and Pickering, 2015). Residents in both cities cared about improving biodiversity levels, but this improvement should not compromise the availability of good facilities. Interviews with professionals and the literature review revealed existing practical ways to achieve the biodiversity–amenity strategy: 1) dividing parks into several zones with corresponding functions to enhance biodiversity and amenities in each (Wang *et al.*, 2021), 2) carefully designing facilities according to ecological principles as well as making them fine-tuned to the physical and ecological features of the site, 3) incorporating ecology-based recreation facilities, such as wildlife feeders and houses (Nassauer, 1995), 4) in parks primarily designated for biodiversity conservation/enhancement, incorporating small-scale but visible and recognisable facilities in intensively used areas might be more appropriate than providing large-scale facilities, and 5) appropriately incorporating understorey plantings and using more native species in parks mainly established for amenity-related functions may help increase their biodiversity value while not detracting from their appeal to the public (Ives and Kelly, 2016).

As mentioned earlier, there was a general public demand for higher levels of biodiversity in urban parks. However, during the interview, more nuanced perceptions of different levels of biodiversity in parks were identified. Some public interviewees thought the level of biodiversity in parks should be maintained at an appropriate level and should be suited to urban settings. They

had concerns about the possible messy, untidy appearance of very biodiverse parks as well as potential human–wildlife conflicts, for example, fears and attacks to visitors or their pets caused by wildlife. The interviews also revealed that some residents preferred plant biodiversity over animal biodiversity. According to these interviewees, rich biodiversity should appear in rural nature reserves rather than in urban parks and city contexts. It seems these concerns were not targeted at biodiversity *per se* but related to the appropriate context/setting for supporting it. This suggests that the relationship between people and biodiversity in urban environments is not that straightforward, reinforcing the research by Schwartz *et al.* (2014) and Campbell-Arvai (2019). In addition, this study identified that in both Hangzhou and Shanghai, those who exhibited a greater preference for rich biodiversity were more likely to prefer fewer artificial facilities and low-intensive/near-natural maintenance in urban parks. Such preference interactions were in residents' minds and it seems they echo with the relationships between real biodiversity and maintenance/facilities to some extent (Section 2.5). While this research had done literature on the relationship between biodiversity and maintenance/facilities in reality, more research could be conducted to investigate this issue in more detail.

Research objective 2: Public perceptions of and preferences for the novel, wild park style versus the traditional style

The findings from the focus groups and interviews indicated that participants' perceptions of wild versus traditional park styles primarily focused on five aspects: 1) facilities, 2) flora, fauna, and restorative nature, 3) maintenance and aesthetic value, 4) safety and 5) place attachment. Specifically, with trees and woodlands and some animal species, wild parks were thought to have a restorative function by helping residents to relax after work and escape their routine, busy urban life. Wild parks often evoked positive place attachment, especially childhood memories of wild experiences in the countryside, for

example, playing near wild ponds and in wild woods. Nevertheless, wild parks were considered lacking recreational and sufficient supporting amenities and were seen as less well maintained and less aesthetically attractive than traditional parks. As for the aspect of safety, in focus groups, most participants indicated that they felt safe and had no particular safety concerns in wild parks. However, during the interviews, many female participants spontaneously mentioned that wild parks evoked a sense of insecurity.

Furthermore, this study found evidence that residents in both Hangzhou and Shanghai were more inclined to prefer the traditional park style over the wild park style. It seems that in spite of the views on respecting nature and “oneness with nature” rooted in Chinese traditional culture, contemporary Chinese residents may not be accepting of a wilder, messier ecological aesthetic (Gobster *et al.*, 2007) in urban parks. This may be different from Western countries, such as the UK (Hoyle, Hitchmough and Jorgensen, 2017) and Australia (Harris *et al.*, 2018), where research reported an increasing acceptance of ecological aesthetics in urban landscapes.

According to this result, the study suggests a combination of biodiversity-friendly measures and some traditional, ornamental park elements in practices. For example, some areas of lawns and exotic plants could be replaced with native plants, as practised in Australia and New Zealand (Ignatieva, 2021). Ecological strategies used in Chinese classical gardens could be re-introduced into the traditional, ornamental design framework influenced by Western culture. These include designing multi-layered plant communities, introducing diverse ground cover species, using indigenous plants, protecting old trees, and retaining wild vegetation in suitable areas to replace lawns and flowerbeds. The study also suggests that native natural wildflower meadows in China's different regions (e.g. western Sichuan, Inner Mongolia, Yunnan, etc.) provide

inspirations as lawn alternatives in urban parks, as they are visually attractive and provide various ecosystem services. These communities provide native herbaceous species for cultivation to be applied in urban parks. The recent case of the green space in Shuangguihu National Wetland Park in Chongqing (Yuan *et al.*, 2021) is inspired by wildflower meadows in western Sichuan. Moreover, replacing lawns and exotic plants in high-amenity areas with native crop species could be further promoted, as this study identified the appreciation of crop species, notably among older people. Terraced plantings with native crop species could enrich the diversity of green spaces, function as environmental education classrooms, and symbolically evoke the agricultural past of Chinese cities.

This study showed that public preferences for the wild park style increased when it demonstrated a higher degree of human modification and intention as *intended wildness* (Hwang and Yue, 2019). Related human modification and intention include improving maintenance levels, adding more amenities, and maintaining woodlands to a more semi-open character, echoing the design concept of cues to care (CTC) for messy ecosystems proposed by Nassauer (1995). Future wild park designs should consider these interventions based on ecological principles. This is not a means of changing wild parks into traditional parks; rather, it is a means of responding to human expectations in a way that ultimately benefits biodiversity. Specifically, this study suggests small-scale but visible and recognisable CTC, such as mowing a strip along pathways to indicate maintenance in intensively used areas. A complete and interesting environmental interpretive system could be given consideration as a part of wild parks' recreational experience. More colourful flowers could be introduced in places that people can easily get to. Some attractive exotic species, whether they occur spontaneously or are intentionally planted, could be retained in wild parks. Jiangyangfan Eco-Park, for example, has introduced horticultural flower

borders filled with some exotic perennial and annual flowers along the main footpath. However, it is important to note that the use of exotic species to improve landscape attractiveness should be monitored and managed appropriately to avoid large-scale threats to endangered native species.

Research objective 3: Preferences for park biodiversity and for the wild park style among the public's different sociocultural groups and between the public and ecology/landscape professionals

The study revealed that the factor of dwelling city had a bearing on public preferences for the attribute biodiversity and for the wild park style: Hangzhou's residents had a significantly higher preference for biodiversity and for the wild park style than Shanghai's residents. The study initially expected residents of Shanghai, being a more urbanised, sophisticated and developed city than Hangzhou, to have a stronger appreciation of biodiversity and the related wild park style, yet this was not confirmed. Interviews revealed Hangzhou residents' greater access to biodiverse green spaces in their daily lives and their interest in biodiversity-related activities, such as gardening and bird feeding on their balconies or in their backyards. These activities may help nurture their ecological awareness and appreciation.

The study also identified significant differences in preferences for biodiversity between education groups and between the public and professionals in Shanghai. Shanghai residents with postgraduate degree or higher education valued biodiversity significantly more than those with high school or below education. As expected, ecology/landscape professionals, who possessed more elaborate knowledge in the area of expertise, significantly valued biodiversity more than the general public did. These findings may suggest the importance of education and professional involvement for the appreciation of biodiversity, implying that a learnt, education/professional knowledge-driven

perception of biodiversity. These significant differences, however, were not identified in Hangzhou; thus, they are difficult to generalise and should be treated with some caution. Nevertheless, in both cities, and in the whole sample when the two cities were considered as a whole, this study found that preferences between wild versus traditional park styles varied between public and professional groups: while the public tended to prefer the traditional park style, professionals preferred the wild style and significantly preferred this park style more than the public did.

Such a difference between professionals and the public has important implications for the planning, design and management of urban parks. Professionals should consider this difference in their preferences compared to the public when designing wild parks in the future. Currently, most Chinese wild park projects are led by professionals or government, and residents' involvement is rare. It is important to promote public engagement in the future planning, design and management process. Recently, citizen science and social participation projects have been integrated into the management of wild parks in China (e.g. 19th Botanical Congress Memorial Park), allowing the general public to observe and record on-site species and moderately clean up invasive species. Environmental education about urban biodiversity and wild urban nature is important to cultivate the general public's ecological literacy. This study also suggests that a mosaic of traditional/ornamental and biodiverse/wild designs in urban landscapes might be conducive to satisfying different groups' expectations towards parks. No one park design style/type should be replaced by another. It is necessary to have all of them, since they afford different roles and serve different people with different needs. This requires integrated, systematic urban green space planning and the development of official guidelines that prioritise both biodiversity conservation and human wellbeing. Interdisciplinary collaborations across ecological and

natural sciences, social sciences, and landscape planning and design are essential to achieve these goals.

Overall, this study reflects the social dimension of urban biodiversity and wild, naturalistic urban greenery in China, a less well-known context compared with developed countries in terms of the research subject (Botzat, Fischer and Kowarik, 2016). The insights gained from this study expand the existing research and help to understand this topic in the Chinese context. Furthermore, practical implications identified by this study may contribute to future Chinese urban park practices to achieve the co-benefits of biodiversity promotion and social expectations. Policymakers can use these implications as recommendations for improving and designing urban greening and urban biodiversity conservation/enhancement policies and strategies in China.

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Appendices

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Appendix A-Literature review

Appendix A-1: Papers included in the literature review about the relationship between maintenance and biodiversity in urban green spaces

Authors	Region	Flora and/or fauna studied
(Mahan and O'Connell, 2005)	Centre county, PA, America	Small mammal assemblages
(McFrederick and LeBuhn, 2006)	San Francisco, America	Bumble bees
(Zuo <i>et al.</i> , 2008)	Chongqing, China	Butterflies
(Shwartz, Shirley and Kark, 2008)	Tel Aviv, Israel	Birds
(Öckinger, Dannestam and Smith, 2009)	Malmö, Sweden	Butterflies
(Bertoncini <i>et al.</i> , 2012)	Paris, France	Plants
(Lin <i>et al.</i> , 2012)	Chongqing, China	Butterflies
(Qiu, Lindberg and Nielsen, 2013)	Helsingborg, Sweden	Plants
(Venn and Kotze, 2014)	Helsinki, Finland	Carabid beetle assemblages
(Chong <i>et al.</i> , 2014)	Singapore	Birds and butterflies
(Yang <i>et al.</i> , 2015)	Shanghai, China	Birds
(Fischer <i>et al.</i> , 2016)	Santiago de Chile	Plants
(Filibeck, Petrella and Cornelini, 2016)	Rome, Italy	Plants
(Sing <i>et al.</i> , 2016)	Shenzhen, China	Butterflies
(Rudolph <i>et al.</i> , 2017)	Cologne and Munster, North Rhine-Westphalia, Germany	Plants
(Luo <i>et al.</i> , 2017)	Dujiangyan, China	Soil fauna community
(Müller <i>et al.</i> , 2018)	Aarhus, Denmark	Plants, birds, and invertebrates and habitat structural complexity
(Chollet <i>et al.</i> , 2018)	Rennes, France	Plants
(Yang <i>et al.</i> , 2019)	Xi'an, China	Plants, and insect pollinators (bees, butterflies, hoverflies, and moths)
(Talal and Santelmann, 2019)	Portland, America	Plants
(Dylewski, Maćkowiak and Banaszak-Cibicka, 2019)	Poznań, Poland	Three main groups of pollinators – wild bees, butterflies, and hoverflies
(Aguilera <i>et al.</i> , 2019)	Malmö, Sweden	Butterflies
(Hjalmarson and Patten, 2019)	Norman, America	Dragonflies and damselflies (Odonata)
(Dylewski, Maćkowiak and Banaszak-Cibicka, 2020)	Poznań, Poland	Plants
(Daniels <i>et al.</i> , 2020)	Aachen, Germany	Pollinator communities
(Trigos-Peral <i>et al.</i> , 2020)	Warsaw, Poland	Arthropods: ant, spider and harvestmen communities
(Nizamani <i>et al.</i> , 2021)	Haikou, China	Woody plants
(Manu <i>et al.</i> , 2021)	Bucharest, Romania	Mites (Acari), one group of soil invertebrate
(Cheng <i>et al.</i> , 2022)	Zhanjiang, China	Plants

Appendix A-2: Papers included in the literature review about the relationship between vegetation structure and biodiversity in urban green spaces

Authors	Region	Flora and/or fauna studied
(Jokimäki, 1999)	Oulu, Finland	Birds
(Sandström, Angelstam and Mikusiński, 2006)	Orebro, Sweden	Birds
(Heyman, Gunnarsson and Dovydavicius, 2017)	Review	Arthropods and birds
(Orłowski, Martini and Martini, 2008)	Wrocław, Poland	Birds
(Palmer <i>et al.</i> , 2008)	Melbourne, Australia	Birds
(Khera, Mehta and Sabata, 2009)	Delhi, India	Birds
(Evans, Newson and Gaston, 2009)	UK	Birds
(Heyman, 2010)	south-western Sweden	Birds
(Munro <i>et al.</i> , 2011)	southern Australia	Birds
(Pennington and Blair, 2011)	Cincinnati, America	Birds
(Myczko <i>et al.</i> , 2014)	Poznań, Poland	Birds: Woodpecker
(Paker <i>et al.</i> , 2014)	Tel-Aviv, Israel	Birds
(Yang <i>et al.</i> , 2015)	Shanghai, China	Birds
(Huang <i>et al.</i> , 2015)	Beijing, China	Birds
(Threlfall <i>et al.</i> , 2016)	south-east Melbourne	Bird and bat communities
(Jin <i>et al.</i> , 2016)	Shanghai, China	Soil meso- and micro-fauna community
(Threlfall <i>et al.</i> , 2017)	Melbourne, Australia	bats, birds, bees, beetles and bugs
(Chang, Chen and Su, 2021)	Taipei, Taiwan	Plants
(Gan, 2021)	Shanghai, China	Birds
(Mata <i>et al.</i> , 2021)	Melbourne, Australia	Insects
(Wang <i>et al.</i> , 2021)	Beijing, China	Plants, birds, and insects
(Han <i>et al.</i> , 2022)	Beijing, China	Butterflies
(Wang <i>et al.</i> , 2022)	Beijing, China	Plants, birds, and insects

Appendix A-3: Papers included in the literature review about the relationship between facilities and biodiversity in urban green spaces

Authors	Region	Flora and/or fauna studied
(Ortega-Álvarez and MacGregor-Fors, 2009)	Mexico City, Mexico	Birds
(Evans, Newson and Gaston, 2009)	UK	Birds
(Su, Zhang and Qiu, 2011)	Beijing, China	Willow trunk-dwelling weevils (Coleoptera: Curculionoi- dea) (the changes in richness and composition of local weevil assemblages could provide meaningful information to better understand changes in their living conditions)
(MacGregor-Fors and Ortega-Álvarez, 2011)	Mexico City, Mexico	Birds
(Pennington and Blair, 2011)	Cincinnati, America	Birds
(MacGregor-Fors, Morales-pérez and Schondube, 2012)	Morelia, Mexico	Birds
(Myczko <i>et al.</i> , 2014)	Poznan, Poland	Birds
(Ballantyne and Pickering, 2015)	Review paper	Composition and structure of vegetation and soils
(Gan, Wu and Guo, 2018)	Shanghai, China	Birds
(Wood <i>et al.</i> , 2018)	Bradford, UK	Species richness of plants and animals (birds, butterflies, and bees) and habitat diversity
(Hjalmarson and Patten, 2019)	Norman, America	Dragonflies and damselflies (Odonata)
(Amaya-Espinel <i>et al.</i> , 2019)	Santiago, Chile	Birds
(Villaseñor and Escobar, 2019)	Santiago, Chile	Birds
(Gan, 2021)	Shanghai, China	Birds

Appendix B-Research methodology

Appendix B-1 Biodiversity-friendly park projects in different Chinese cities (by 2019)

Park name	Location	Designed company/institution (main)	Completion date	Design comments
Urban Forest Green Space	Shanghai	East Normal University	2000	Near-natural forest construction; Low-maintenance
Dongguan Nature Park	Dongguan	Dongguan Forestry Bureau	2000	Wildlife habitats; Wetland protection
Jinshagang Green Space	Hangzhou	Atelier DYJG and Beijing Forestry University & Hangzhou Landscape Design Institution	2003	Project involved in "Westward Expanding of West Lake" and the main focus is to improve the ecological and biodiversity quality of the western areas of West Lake by creating wild landscape ambience (in contrast with ornamental scenic West Lake); Pollinator-friendly planting; Wetland restoration; Wastewater management
Maojiabu Green Space	Hangzhou	Atelier DYJG and Beijing Forestry University & Hangzhou Landscape Design Institution	2003	Project involved in "Westward Expanding of West Lake" and the main focus is to improve the ecological and biodiversity quality of the western areas of West Lake by creating wild landscape ambience (in contrast with ornamental scenic West Lake); Pollinator-friendly planting; Wetland restoration; Combined with indigenous large trees, a series of landscape ecological islands were created in water bodies
Wuguitan Green Space	Hangzhou	Atelier DYJG and Beijing Forestry University & Hangzhou Landscape Design Institution	2003	Project involved in "Westward Expanding of West Lake" and the main focus is to improve the ecological and biodiversity quality of the western areas of West Lake by creating wild landscape ambience (in contrast with ornamental scenic West Lake); Pollinator-friendly planting; Wetland restoration; Incorporating water body, swamp, wild island, wild aquatic plants, wet trees and shrubs
Yuhuwan Green Space	Hangzhou	Atelier DYJG and Beijing Forestry University & Hangzhou Landscape Design Institution	2003	Project involved in "Westward Expanding of West Lake" and the main focus is to improve the ecological and biodiversity quality of the western areas of West Lake by creating wild landscape ambience (in contrast with ornamental scenic West Lake); Pollinator-friendly planting; Wetland restoration; Incorporating water body, swamp, wild island, wild aquatic plants, wet trees and shrubs
Huangyan Yongning Park	Taizhou	Turenscape	2004	Mosaic of managed grassland and woodlands, and wild riparian wetlands
Jinshan Park	Fuzhou	NA	2004	Wild forest patches and bamboos were preserved; Heritage banyan trees were preserved

Changqiao Ecological Park	Xishui Restoration	Hangzhou	Hangzhou West Lake Water Area Management Department	Phase I: 2004; Phase II: 2009	Artificial wetlands; Near-natural plant communities and natural succession; The use of local native species; Wastewater management; Functioning as an attraction of rustic appeal
Mengqing Park and nearby fish island	Eco-friendly	Shanghai	Shanghai landscape design and research institute co., LTD.	2005	For Mengqing Eco-friendly Park: Focusing on the habitat function of urban green spaces; Near-natural habitat design; Creating near-natural habitat system by a series strategies such as habitat planning, terrain shaping, water system management, and naturalistic, multi-layered planting. For nearby fish island: Soil management; Dead woods and trees and leaf litter are left on the site to create habitat for soil microbiota and fauna; Natural succession; Near-natural multi-layered planting; Limited public access
Xi'xi Wetland Park		Hangzhou	Hangzhou Landscape Design Institution	2005	Wetland conservation and restoration; Mosaic of managed wetlands and wild forests and wetlands
Jinghu Wetland Park-Meishan		Shaoxing	AECOM	2005	Biodiversity conservation and restoration; Working with existing wild forest
Tanghe Ribbon Park		Qinhuangdao	Turenscape	2006	A wild remnant riparian habitat was completely preserved; Main intervention to the site is a wandering boardwalk which lined by a red bench
Binjiang Forest Park		Shanghai	Shanghai landscape design and research institute co., LTD.	2007	Main target: wild urban ecosystems and an ecological environment for flora, fauna, and people; Working with existing urban nature by intervening (try to be invisible) in some parts through near-natural planting, whilst intervening very little in other parts of the site; Low maintenance manner; The use of wildflower meadows
Paotaiwan Wetland Forest Park		Shanghai	Shanghai Engineering Design Institute Ltd.	2007	The use of local native species; Conservaiton of exisiting wetlands and mudflats (not intervening); Forest planting
Lvtanghe Wetland Park		Zhanjiang	Zhangjiang Landscape Design Institution	2007	Protection of natural processes; Ecological restoration; Natural succession; The use of native species
Bridge Park		Tianjin	Turenscape	2008	Let nature work; Low-maintenance ecological park; Creating bioswales; The core zone is composed of many bioswales with different elevations and wetness, interconnected with walkways; Permitting the growth of wild spontaneous vegetation; Environmental interpretive signs
Beach Restoration Park		Qinhuangdao	Turenscape	2008	Islets have been constructed for bird habitats; The concrete embankment has been replaced with ecofriendly riprap; Dunes and various plant communities adapted to the site environments were preserved

Jiangwan Space	Eco-Green	Shanghai	Shanghai landscape design and research institute co., LTD.	2008	Protecting existing on-site wild habitats spontaneously developed on an abandoned airport; Low-maintenance and natural succession; Adding a path system
Banshan Forest Park		Hangzhou	Hangzhou Landscape Design Institution	2008	Protecting wild forest; Mosaic of maintained grasslands and forest, and wild forests
Houtan Wetland Park		Shanghai	Turenscape	2010	Conserving the remnant wetland patch, inaccessible, permitting spontaneous vegetation; Constructing a new artificial wetland; New water treatment technology
Jiangyangfan Eco-Park		Hangzhou	Atelier DYJG	2010	Existing spontaneous woodlands and wetlands were preserved without interventions; Inclusion of wild vegetation; Some understory plants such as pollinator-friendly plants were introduced at a proper scale
Qunli Wetland Park		Harbin	Turenscape	2011	Conserving all on-site wild wetland patches; Adding constructed wetlands on the outskirts of the park to supplement existing wild ecosystems; Working with ruderal vegetation
Dazhenpu Wetland Park		Dongguan	Shenzhen Landscape Design Ltd.	Beilinyuan 2011	Focusing on water management, terrain shaping, and habitat design; Through the construction of different water bodies and landforms, different wetland habitats were formed to attract birds, amphibians and insects, so as to achieve the purpose of biodiversity
Huaqiao North Lake Wetland Park		Shenzhen	Shenzhen Landscape Design Ltd. & SWA	Beilinyuan 2011	Ecological restoration; Forest plantings; Existing ecosystem conservation; Limited public access; Creating "wild" atmosphere with few artificial elements
Linping Park		Hangzhou	Hangzhou Landscape Design Institution	2012	Protecting wild forest; Mosaic of maintained grasslands and forest, and wild forests
Ningbo Eco-Corridor		Ningbo	SWA	2013	Transforming an abandoned industrial site into a linear urban park; Establishing a multi-scale wetland and woodland system consisting of bioswales, rain gardens, riparian vegetation, and native species mixed forest

Yong River Platform Park	Ningbo	AECOM		2013	Restoring riparian wetlands to provide habitats for avian and aquatic species; The use of indigenous wildflower meadows (pollinator-friendly) and grasslands; The use of native perennials and grasses; The park has diverse habitats such as mudflats, weed wetland, wet meadow, grassland, forest edge, and broad canopy trees, supporting a wide range of species
Haizhu Wetland Park	Guangzhou	Guangzhou Urban Planning Design Research Institute, Hangzhou Landscape Design Institution, etc.		Haizhu lake: 2013 Phase I: 2012 Phase II: 2015	Has wetlands, woodlands, lake, river, orchard fish ponds; Zones: public accessible zone (Haizhu lake) and limited accessible zones (Phase I and Phase II); Phase II focuses on "nature, ecology, and wild," aiming to conserve/enhance biodiversity
Futian Mangrove Park	Shenzhen	Shenzhen Landscape Design Ltd.	Beilinyuan	2013	Prioritisation of biodiversity conservation; Limited public access
Harbin Cultural Center Wetland Park	Harbin	Turenscape		2014	Vegetation above the water line is managed by the strategy of passive rewilding, and higher areas are designed with naturalistic meadows; Stormwater wetlands; Preserving as much of the on-site existing spontaneous trees and ground covers as possible; The use of native tree species (Betula platyphylla and Fraxinus mandschurica).
Donghu Wetland Park	Wuhan	Wuhan Landscape Design Institution		2014	Protecting existing wetland and woodland habitats
Yanweizhou Park	Jinhua	Turenscape		2014	Wetland restoration; Flood abatement; Creating diverse habitats, including bogs, ponds, marshes, islands, and woodlands; Terraced landscape; Water resilient native planting
Xiwan Mangrove Wetland Park	Shenzhen	Shenzhen Landscape Design Ltd.	Beilinyuan	2015	Protecting mangrove, casuarina, banyan and other remnant vegetation species
Tianhe Daguan Wetland Park	Guangzhou	Turenscape		2015	The use of local species; Low-maintenance; Advocating "Beauty of Weeds"
Xinjiekou Urban Forest Park	Beijing	NA		2018	Urban forest; Near-natural native plant communities; Inclusion of wild vegetation; LID; Pollinator and bird friendly plants
Dongan Wetland Park	Sanya	Turenscape		2016	The core area of the park is a large ecosystem consisting of tree islands; At the edge of the park are permeable landscape spaces consisting of ecological wetlands and ponds; Creating habitats for birds, fish, and amphibians in and around the site

Xige Xinli Green Park	Beijing	NA		2017	Urban forest; Near-natural native plant communities; Inclusion of wild vegetation; LID; Pollinator and bird friendly plants
Yijayuan Conservation Space	Nature Green	Shanghai	Urban Forest Studio	2016	Rewilding; The use of native species; Natural succession; Inclusion of ruderal vegetation and dead woods; Introducing pollinator-friendly vegetation
Mangrove Ecological Park	Sanya	Turenscape		2016	Restoration of mangrove ecosystem
Jinhai Wetland Park	Shanghai	Shanghai landscape design and research institute co., LTD.		2016	Protecting existing wetland and woodland habitats; Inclusion of ruderal vegetation; Natural succession; Low-maintenance; Important wildlife habitat
Changlefang Urban Forest Park	Beijing	NA		2018	Urban forest; Near-natural native plant communities; Inclusion of wild vegetation; LID; Pollinator and bird friendly plants
Guangyanggu Forest Park	Urban	Beijing	Beijing Topsisense Landscape Design Ltd.	2017	Urban forest; Near-natural multi-layers native plant communities with relatively complex structures and compositions; Inclusion of wild vegetation
Chengxi Forest Park		Hangzhou	Hangzhou Landscape Design Institution	2017	Working with wild forest patch by preserving existing ones and artificially introducing new ones
19th Botanical Congress Memorial Park		Shenzhen	Guangzhou Turenscape	2017	Passive rewilding; Adding a path system; Improving soil quality
Xinzhongjie Urban Forest Park		Beijing	NA	2018	Urban forest; Near-natural native plant communities; Inclusion of wild vegetation; Heritage trees; Dense woodlands; LID
Yiqingyuan Urban Forest Park		Beijing	NA	2018	Urban forest; Near-natural native plant communities; Inclusion of wild vegetation; LID; Pollinator and bird friendly plants
Haikou Meishehe Fengxiang Park		Haikou	Turenscape	2019	Riparian habitats consisting of woodlands, terraces, wetlands, and islands; The use of native species; Creating habitats for egrets
Jiuxi Park		Hangzhou	Hangzhou Municipal Bureau of Garden and Cultural Relics	NA	Wild urban ecosystem; Low-maintenance; Inclusion of ruderal vegetation
Yunqizhujing Park		Hangzhou	Hangzhou Municipal Bureau of Garden and Cultural Relics	NA	Wild urban ecosystem; Heritage trees; Dense woodlands; Low-maintenance; Inclusion of ruderal vegetation
Gushan Park		Hangzhou	Hangzhou Municipal Bureau of Garden and Cultural Relics	NA	Wild urban ecosystem; Low-maintenance; Inclusion of ruderal vegetation

Appendix B-2 Focus group discussion topic guide

1. Welcome and introduction
2. Distribution of ethical consent forms and the questionnaire seeking participants' socio-cultural information
3. Environmental aspects (attributes) of urban parks that participants consider important, which could influence their choices of preferred parks 3.1 What are your favourite urban parks in Hangzhou/Shanghai? Why? 3.2 What aspects of urban parks you consider important and could influence your choice of your preferred parks?
4. Experiences of the selected wild and traditional park sites <u>For Hangzhou participants:</u> 4.1 What are your personal experiences in Jiangyangfan Eco-Park? For example, your likes or dislikes? Why? 4.2 What are your personal experiences in Prince Bay Park? For example, your likes or dislikes? Why? Note: If participants do not mention issues related to activities and safety in their experiences, ask the next four questions: 4.3 What do you like doing in Jiangyangfan Eco-Park? 4.4 What do you like doing in Prince Bay Park? 4.5 Do you go to Jiangyangfan Eco-Park by yourself or, with other people? Why? (relevant to safety issues) 4.6 Do you go to Prince Bay Park by yourself or, with other people? Why? (relevant to safety issues) <u>For Shanghai participants:</u> 4.1 What are your personal experiences in Houtan Wetland Park? For example, your likes or dislikes? Why? 4.2 What are your personal experiences in Qiantan Recreation Park? For example, your likes or dislikes? Why? Note: If participants do not mention issues related to activities and safety in their experiences, ask the next four questions: 4.3 What do you like doing in Houtan Wetland Park? 4.4 What do you like doing in Qiantan Recreation Park? 4.5 Do you go to Houtan Wetland Park by yourself or, with other people? Why? 4.6 Do you go to Qiantan Recreation Park by yourself or, with other people? Why?
5 Environmental interventions for the wild park sites <u>For Hangzhou participants:</u> 5.1 What would you change in Jiangyangfan Eco-Park if you could? <u>For Shanghai participants:</u> 5.1 What would you change in Houtan Wetland Park if you could?
6 Preferences between the selected wild and traditional park sites Note: This is only asked if the participants do not mention their preferences as asked in part 4. <u>For Hangzhou participants:</u> 6.1 Between Jiangyangfan Eco-Park and Prince Bay Park, which park do you prefer? Why? <u>For Shanghai participants:</u> 6.1 Between Houtan Wetland Park and Qiantan Recreation Park, which park do you prefer? Why?
7 Understandings of biodiversity

Note: If participants have spontaneously mentioned biodiversity-related words and phrases (e.g., “biodiversity,” “species,” “diversity,” “wildlife,” “ecological value,” etc.) in previous discussions, the moderator should drop in a little bit in the previous conversation to ask for details about biodiversity, including

7.1 Have you ever come across the term “biodiversity”?

If no, not ask the following questions.¹ If yes, ask:

7.2 What does biodiversity mean to you?

7.3 Talking about a park with high and low levels of biodiversity, what comes to your mind first?

If in the end of discussions, participants still haven't talked about biodiversity-related words and phrases, the moderator directly asks questions 7.1, 7.2, and 7.3.

8 Conclusion by summarising and thanking the participants with a small gift as a token of appreciation.

¹ For those who had not heard of the term “biodiversity,” I initially planned to provide definition and information about the term “biodiversity” and then ask their perceptions and understandings. However, it was possible that these participants might be uncomfortable talking about biodiversity if they did not come across the term and had no interests in this term. Thus, in group discussions, for those who had not heard of the term, they were not asked about their understandings.

Appendix B-3 Design of Adaptive Choice-Based Conjoint questionnaire

Sawtooth's recommendation of Design settings for ACBC

Attributes brought into ACBC: (Not counting a "summed price" attribute)	3	5	7	10	12
Screening Tasks:					
Number of Screening Tasks	6	6	7	8	8
Number of Concepts per Screening Task	3	4	4	4	5
Minimum Attributes to Vary from BYO Selections	1	1	2	2	2
Maximum Attributes to Vary from BYO Selections	2	2	3	4	4
Unacceptables:					
Number of Unacceptables	3	3	4	5	5
Must Haves:					
Number of Must-Haves	2	2	3	4	4
Choice Task Tournament:					
Maximum Number of Concepts in Choice Tournament	12	14	16	20	24

The design of important parameter settings of ACBC questionnaire was completed within three tabs, namely, Attributes, Prohibitions, and Design, in ACBC Exercise Settings in Lighthouse Studio 9.8.1.

Three tabs	Description
<i>Attributes</i> tab	This tab helps to specify information about attributes, levels, the nature of the attributes (sequence order, preference order), if these attributes included in BYO and Must-Haves and Unacceptables or not. - In this study, all five attributes were specified with no preference order (best to worst or worst to best) and they were all included in BYO. - Four attributes, namely, biodiversity, facilities, woodlands, and maintenance were specified with sequence order from "high to low," whereas the attribute "seasonal views" was not specified with sequence order, as it is non-sequential but categorical. - All the attributes were included in Must-Haves and Unacceptables.

	ACBC Exercise Settings - UrbanParksEnglishVersion AttributesPricingAlternative-SpecificProhibitionsDesignShared Question SettingsConditional DisplayMerged Rows List of Attributesattributes <table><thead><tr><th></th><th>Attribute</th><th>List of Levels</th><th>Sequence Order</th><th>Preference Order</th><th>Include In BYO</th><th>Include In Must Haves and Unacceptables</th></tr></thead><tbody><tr><td>1</td><td>Biodiversity:</td><td>Biodiversity</td><td>High to Low</td><td>None</td><td>Yes</td><td>Yes</td></tr><tr><td>2</td><td>Facilities:</td><td>facilities</td><td>High to Low</td><td>None</td><td>Yes</td><td>Yes</td></tr><tr><td>3</td><td>Woodlands:</td><td>Woodlands</td><td>High to Low</td><td>None</td><td>Yes</td><td>Yes</td></tr><tr><td>4</td><td>Maintenance:</td><td>Maintenance</td><td>High to Low</td><td>None</td><td>Yes</td><td>Yes</td></tr><tr><td>5</td><td>Seasonal views:</td><td>Seasonalviews</td><td>None</td><td>None</td><td>Yes</td><td>Yes</td></tr></tbody></table> RenameOKCancel		Attribute	List of Levels	Sequence Order	Preference Order	Include In BYO	Include In Must Haves and Unacceptables	1	Biodiversity:	Biodiversity	High to Low	None	Yes	Yes	2	Facilities:	facilities	High to Low	None	Yes	Yes	3	Woodlands:	Woodlands	High to Low	None	Yes	Yes	4	Maintenance:	Maintenance	High to Low	None	Yes	Yes	5	Seasonal views:	Seasonalviews	None	None	Yes	Yes
	Attribute	List of Levels	Sequence Order	Preference Order	Include In BYO	Include In Must Haves and Unacceptables																																					
1	Biodiversity:	Biodiversity	High to Low	None	Yes	Yes																																					
2	Facilities:	facilities	High to Low	None	Yes	Yes																																					
3	Woodlands:	Woodlands	High to Low	None	Yes	Yes																																					
4	Maintenance:	Maintenance	High to Low	None	Yes	Yes																																					
5	Seasonal views:	Seasonalviews	None	None	Yes	Yes																																					
Prohibitions tab	Setting: Attributes tab Combinations of particular attribute levels may not be realistic in real life. This tab permits the prohibitions/restrictions between particular attribute levels so that certain levels cannot be presented together. Sawtooth suggests prohibitions should be avoided as many as possible, since prohibitions can lead to loss of precision of utility value estimation (Sawtooth Software, no date a). This research did not include any prohibitions, as there were no certain attribute levels that cannot be presented together in a real urban park.																																										
Design tab	In order to maintain reliability of the results, Sawtooth suggests for each respondent, each level should be seen at least two times, and preferably three times (Sawtooth Software, no date a). This tab helps to specify some parameters to ensure this rule of thumb. 1) Parameter1: The number of park scenarios to evaluate for each respondent in Screening. It equals to Number of Screening Tasks * Number of Scenarios per Screening Task. • According to Sawtooth's recommendation regarding five attributes, the number of screening tasks was specified as 6 and the number of concepts per screening task was specified as 4 to ensure results' reliability (Sawtooth Software, no date b). 2) Parameter2: Maximum/minimum attributes to vary from BYO when generating park scenarios for Screening. • Sawtooth recommends 2 as the maximum attributes to vary and 1 as the minimum attributes to vary regarding five attributes (Sawtooth Software, no date b). This research followed this recommendation. 3) Parameter3: Number of Unacceptables/Must-haves. • The rule of thumb is Unacceptables = (Screening Tasks - 3); and Must-Haves = (Screening Tasks - 4) (Sawtooth Software, no date b). Therefore, Unacceptables was specified as 3 and Must-Haves was 2 in this study. 4) Parameter4: Maximum number of park scenarios brought into Choice Tasks. • Sawtooth recommends 14 for this parameter and this number was used in this study (Sawtooth Software, no date b). 5) Parameter5: Number of scenarios per choice task. • Sawtooth Software recommends choice tasks show either two or three scenarios at a time (pairs or triples) (Sawtooth Software, no date b). Pilot-1 used 3 scenarios per choice task. After the																																										

- pilot feedback, it was changed as 2 scenarios per task.
- 6) Avoid dominated concepts (scenario)?
 - No. A dominated scenario is a scenario that is logically inferior to another scenario based on the Preference Order setting. All attributes in this study did not have preference orders, and thus there was no need to avoid dominated scenarios.
 - 7) Include BYO in Choice Tasks?
 - No, according to Sawtooth's recommendation.

This setting in Design tab ensured the rule of thumb in ACBC that each level can be seen at least two times, and preferably three times, according to the report of Test Design with dummy respondents.

ACBC Exercise Settings - UrbanParksEnglishVersion

Attributes Pricing Alternative-Specific Prohibitions Design Shared Question Settings Conditional Display Merged Rows

Design Settings

Number of Screening Tasks: 6

Number of Concepts per Screening Task: 4

Minimum Attributes to Vary from BYO Selections: 1

Maximum Attributes to Vary from BYO Selections: 2

BYO-Product Modification Strategy: Mixed Approach

Number of Unacceptables: 3

Number of Must Haves: 2

Maximum Number of Product Concepts Brought into Choice Tournament: 14

Number of Concepts per Choice Task: 2

Number of Calibration Concepts: 0

Avoid Dominated Concepts: ☐

Include BYO in Tournament: ☐

Test Design

Respondents: 500

Specify Effects...

Test Design...

Rename OK Cancel

Setting: Design tab

Sawtooth test design report

Respondent Number	Minimum Times Any Level Shown	Biodiversity:			Facilities:			Woodlands:			Maintenance:			Seasonal views:			
		Species rich flora and fauna	Species moderate flora and fauna	Species poor flora and fauna	Supporting facilities & recreation/ play facilities	Supporting facilities, recreation/ play facilities	Few facilities	Wooded areas with dense trees	Mix of some trees and open areas	Sparse trees	Well-maintained, neat-looking	Moderate-maintained, less neat-looking	Low-maintenance, wild-looking	Spring flowers	Summer green canopy trees	Autumn colourful (such as golden or red) foliage	Winter branch-trunk viewing plants/ conifer trees
1	3	3	5	16	3	5	16	4	17	3	4	16	4	3	15	3	3
2	3	16	5	3	4	16	4	4	16	4	3	4	17	3	3	14	4
3	3	4	16	4	4	16	4	16	5	3	17	4	3	14	3	3	4
4	3	4	16	4	3	4	17	16	5	3	4	17	3	13	4	4	3
5	3	4	16	4	17	4	3	4	16	4	16	5	3	4	3	14	3

Sawtooth test design report (all the levels have appeared three times or more for each robotic respondent)

Appendix B-4 ACBC questionnaire

ACBC questionnaire



中国城市居民对城市公园感知与偏好研究

您好!

感谢您在百忙之中参加此次由英国爱丁堡大学建筑与景观学院研究人员开展的“中国城市居民对城市公园感知与偏好研究”课题问卷调查。

请单击“下一步”开始。

课题负责人: Xinlei Hu
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爱丁堡大学建筑与景观学院

Edinburgh School of Architecture and Landscape Architecture, the University of Edinburgh



中国城市居民对城市公园感知与偏好研究

此项研究是为了了解中国城市居民对城市公园的感知以及选择偏好。问卷调查包括两个部分: 第一部分调查居民的公园选择偏好, 第二部分调查居民的个人基本信息以及公园游览体验。此次问卷调查大约需要10到15分钟来完成。您的回答没有正确或错误之分, 您提供的信息将对指导中国城市公园的规划、设计和管理具有重要意义, 我们希望能了解更多您对于城市公园的观点和意见。

此项研究已于2019年通过爱丁堡大学伦理审查, 这意味着您的参与是匿名的, 在此问卷中您提供的信息(包括您的个人信息)只适用于此次学术课题研究, 不会经由任何途径公开泄露, 您有权在任何时间撤回您的问卷信息。如有疑问, 请联系+8615251894711 (胡同学), 感谢您的合作。

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Edinburgh School of Architecture and Landscape Architecture, the University of Edinburgh

第一部分：公园选择与偏好

此部分使用“联合分析法”，旨在了解您对各种不同类型公园的选择偏好情况。我们确定了城市公园中的5类重要要素，每个要素由一定的要素特征组成，如下：

要素	要素特征
动植物物种丰富度： 此要素描述公园的动物和植物的种类丰富度。	动植物种类丰富多样
	动植物种类一般丰富
	动植物种类不丰富
设施： 此要素描述公园的设施情况，包括基础设施（如休息设施）以及娱乐游憩设施。	有基础设施（如休息设施）以及娱乐游憩设施
	有基础设施（如休息设施），无娱乐游憩设施
	极少量设施
树林： 此要素描述公园中树林的树木密度和结构。	树木密集的树林
	一些树木和开敞地带结合的树林
	树木稀疏的树林
维护： 此要素描述公园的维护管理情况，如植物的修剪以及外观的有序整洁程度。	维护程度高，外观整洁有序
	维护程度中等，外观较为整洁有序
	维护程度低，外观野态
季节景色： 此要素描述公园的典型季节性景色，公园往往在特定的季节有属于这个季节的特色景观。	春季花卉
	夏季高大绿色乔木
	秋季彩色叶（如金色或红色）植物
	冬季松柏及具有枝干形态特色植物

问卷将围绕这5类要素展开，变换每类要素中的不同特征，进行排列组合，构成多种不同的公园组合。这些不同的公园组合将反复出现，以此来准确测试您对它们的选择偏好。

在阅读完以上的内容后，请单击“下一步”正式进入第一部分公园选择与偏好的问卷填写。

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中国城市居民对城市公园感知与偏好研究

想象一下我们正在为您设计建造一个您梦想中的理想城市公园，请为下面列出的每个要素选择一个您最喜欢的特征选项。

要素	要素特征
动植物物种丰富度:	☒ 动植物种类丰富多样 ☐ 动植物种类一般丰富 ☐ 动植物种类不丰富
设施:	☒ 有基础设施 (如休息设施), 以及娱乐游憩设施 ☐ 有基础设施 (如休息设施), 无娱乐游憩设施 ☐ 极少量设施
树林:	☐ 树木密集的树林 ☒ 一些树木和开敞地带结合的树林 ☐ 树木稀疏的树林
维护:	☒ 维护程度高, 外观整洁有序 ☐ 维护程度中等, 外观较为整洁有序 ☐ 维护程度低, 外观野态
季节景色:	☒ 春季花卉 ☐ 夏季高大绿色乔木 ☐ 秋季彩色叶 (如金色或红色) 植物 ☐ 冬季松柏及具有枝干形态特色植物

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中国城市居民对城市公园感知与偏好研究

以下每列代表一个假设的城市公园，针对每一个假设的城市公园，请选择它是否对您有一定的吸引力（即您是否有可能喜爱它）。

(1 of 6)

动植物物种丰富度:	动植物种类丰富多样	动植物种类不丰富	动植物种类丰富多样	动植物种类丰富多样
设施:	极少量设施	有基础设施 (如休息设施), 以及娱乐游憩设施	有基础设施 (如休息设施), 以及娱乐游憩设施	有基础设施 (如休息设施), 以及娱乐游憩设施
树林:	树木密集的树林	树木密集的树林	一些树木和开敞地带结合的树林	树木密集的树林
维护:	维护程度高, 外观整洁有序	维护程度中等, 外观较为整洁有序	维护程度高, 外观整洁有序	维护程度中等, 外观较为整洁有序
季节景色:	夏季高大绿色乔木	春季花卉	春季花卉	秋季彩色叶 (如金色或红色) 植物
	☐ 对我有吸引力 ☒ 对我没有吸引力	☐ 对我有吸引力 ☒ 对我没有吸引力	☒ 对我有吸引力 ☐ 对我没有吸引力	☒ 对我有吸引力 ☐ 对我没有吸引力

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Edinburgh School of Architecture and Landscape Architecture, the University of Edinburgh



中国城市居民对城市公园感知与偏好研究

我们注意到，您避开了具有以下特征的城市公园，在这些特征中，有您认为对一个城市公园来说**完全无法接受**的特征吗？如果有，请在下方选出**您最不能接受的一个特征**，这样我们就可以更好地把重点放在满足您需求的城市公园上。

☐ 动植物物种丰富度：- 动植物种类丰富多样

☐ 维护：- 维护程度高，外观整洁有序

☐ 季节景色：- 春季花卉

☒ 树林：- 树木密集的树林

☐ 设施：- 有基础设施（如休息设施），以及娱乐游憩设施

☐ 这些都可以接受（不是完全不可接受的）

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中国城市居民对城市公园感知与偏好研究

我们注意到您选择了具有如下特征的公园，这其中**有您认为对您喜爱的城市公园来说必须具有的特征**吗？如果有，请在下方选出一个**最重要的您认为必须具有的特征**，这样我们可以更好地关注符合您需求的城市公园。

☐ 维护：- 至多：维护程度中等，外观较为整洁有序

☐ 季节景色：- 春季花卉

☒ 这些都不是必须具有的特征

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爱丁堡大学建筑与景观学院

Edinburgh School of Architecture and Landscape Architecture, the University of Edinburgh



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在这两个城市公园中（请假设除了以下所呈现的，这两个公园的其他方面都相同），请选择出**您最喜爱的一个**。（相同的特征已经被加深为蓝色，这样您可以更好地关注背景为白色的不同特征）

(1 of 13)

动植物物种丰富度：	动植物种类丰富多样	动植物种类丰富多样
设施：	有基础设施（如休息设施），无娱乐游憩设施	极少量设施
树林：	树木密集的树林	树木密集的树林
维护：	维护程度低，外观野态	维护程度高，外观整洁有序
季节景色：	春季花卉	春季花卉

☒

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您的年龄段是（请在下方选择）：

☒ 18-34岁

☐ 35-59岁

☐ 60岁及60岁以上

您的性别（请在下方选择）：

☐ 男

☒ 女

您的居住社区（请在下方填写。如果您不愿意透露所在街道和社区信息，可跳过这两栏）：

所在城市的行政区：

所在街道：

所在社区：

中国城市居民对城市公园感知与偏好研究

您是否去过杭州江洋畹生态公园？

☒ 是

☐ 否

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请选择您对江洋畹生态公园**动植物种类丰富度**的评价（单选）：

☒ 动植物种类丰富多样

☐ 动植物种类一般丰富

☐ 动植物种类不丰富

请选择您对江洋畹生态公园**设施**的评价（单选）：

☐ 有基础设施（如休息设施）以及娱乐游船设施

☒ 有基础设施（如休息设施），但无娱乐游船设施

☐ 有极少量设施

请选择您对江洋畹生态公园**树林**的评价（单选）：

☒ 有树木密集茂密的树林

☐ 有一些树木和开敞地带结合的树林

☐ 有树木稀疏零星的树林



中国城市居民对城市公园感知与偏好研究

您是否去过杭州太子湾公园？

☒ 是

☐ 否

上一步

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请选择您对太子湾公园动植物种类丰富度的评价（单选）：

☐ 动植物种类丰富多样

☒ 动植物种类一般丰富

☐ 动植物种类不丰富

请选择您对太子湾公园设施的评价（单选）：

☒ 有基础设施（如休息设施）以及娱乐游憩设施

☐ 有基础设施（如休息设施），但无娱乐游憩设施

☐ 有极少量设施

请选择您对太子湾公园树林的评价（单选）：

☐ 有树木密集茂密的树林

☒ 有一些树木和开敞地带结合的树林

☐ 有树木稀疏零星的树林



中国城市居民对城市公园感知与偏好研究

您是否去过后滩公园？

☒ 是

☐ 否

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下一步

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请选择您对后滩公园**动植物种类丰富度**的评价（单选）：

☒

动植物种类丰富多样

☐

动植物种类一般丰富

☐

动植物种类不丰富

请选择您对后滩公园**设施**的评价（单选）：

☐

有基础设施（如休息设施）以及娱乐游憩设施

☒

有基础设施（如休息设施），但无娱乐游憩设施

☐

有极少量设施请选择您对后滩公园**树林**的评价（单选）：

☒

有树木密集茂密的树林

☐

有一些树木和开敞地带结合的树林

☐

有树木稀疏零星的树林



中国城市居民对城市公园感知与偏好研究

您是否去过前滩休闲公园？

☒

是

☐

否

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请选择您对前滩休闲公园**动植物种类丰富度**的评价（单选）：

☐

动植物种类丰富多样

☐

动植物种类一般丰富

☒

动植物种类不丰富

请选择您对前滩休闲公园**设施**的评价（单选）：

☒

有基础设施（如休息设施）以及娱乐游憩设施

☐

有基础设施（如休息设施），但无娱乐游憩设施

☐

有极少量设施请选择您对前滩休闲公园**树林**的评价（单选）：

☐

有树木密集茂密的树林

☒

有一些树木和开敞地带结合的树林

☐

有树木稀疏零星的树林

Appendix B-5 Semi-structured interview topic guide

Semi-structured interview topic guide

For public interviewees
1. Welcome and introduction Interviewee's name, hi! I met you and invited you to complete a questionnaire about urban parks on Date/Month/2020/2021. In order to interpret some of the findings from the questionnaire and to check the data, again, I invite you to this interview. Thank you. The questionnaire data is anonymised, so I don't have access to your particular responses. But I would like to talk with you some questions and know your views and opinions.
2. Distribution of ethical consent forms
3. Public responses to biodiversity in urban parks 3.1 Have you ever come across the term "biodiversity" in your life? 3.2 What first comes to your mind taking about this term? (If the interviewee responds yes to the question-3.1) 3.3 Which level of biodiversity richness ² you would like to see in urban parks? For example, high, medium, low? Why? 3.4 Our previous questionnaire asked you questions on five park characteristics, which are biodiversity, facilities, woodlands, maintenance, and seasonal views. Now, could you please rank these five park characteristics by their importance using numbers 1 to 5? Number 1 as the most important, then numbers 2 and 3, and number 5 the least important. Can you explain why you rank as this? Next three questions are for those who stated their preferences for the high level of biodiversity in responding to question 3.3: 3.5 Among the three features of facilities in parks, supporting and recreation/play facilities, supporting facilities without recreation/play facilities, and few facilities, which one you prefer more? Why? 3.6 Among the three features of woodlands in parks, wooded areas with dense trees, mix of some trees and open areas, and sparse trees, which one you prefer more? Why? 3.7 Among the three features of maintenance in parks, well-maintained neat-looking, moderate-maintained less neat-looking, low maintenance, wild-looking, which one you prefer more? Why?
4. Public preferences between wild and traditional park styles, and beneficial environmental interventions for the wild park style 4.1 Now, I'm going to show you two different images of two different urban parks (spread them out). Taking your time... could you please tell me which one you prefer? Why you prefer this? 4.2 For this park (the conductor points to the image with the wild park style), what would you do to improve it? 4.3 In this image (the conductor points to the image with the wild park style), we can see some plants spontaneously settle down and grow in this park. We can also see fallen trees and woods. These plants are not intentionally designed or planted by people. How do you think of this kind of plants? 4.4 How do you think we should treat these plants? 4.5 In this image (the conductor points to the image with the traditional park style), we can see lawns and flowerbeds. So between lawns and flowerbeds versus spontaneously growing plants and fallen trees/woods, which type you prefer? Why?
5. Conclusion and thanking the participants

² For those who respond "no" to question 3.1, use the phrase "flora and fauna species richness". The same for question 3.4.

For professional interviewees
1. Welcome and introduction Interviewee's name, hi! I met you and invited you to complete a questionnaire about urban parks on Date/Month/2020/2021. In order to interpret some of the findings from the questionnaire and to check the data, again, I invite you to this interview. Thank you. The questionnaire data is anonymised, so I don't have access to your particular responses. But I would like to talk with you some questions and know your views and opinions. Also, I would like to know your opinions regarding some findings from the questionnaire.
2. Distribution of ethical consent forms
3. Comments on city differences and socio-cultural differences 3.1 One result from our questionnaire showed that Hangzhou residents significantly valued park biodiversity compared with Shanghai residents. What are your views for this finding? 3.2 One result from our questionnaire is that in Shanghai, education presented significant differences in the valuation of park biodiversity: those with postgraduate degree or higher education significantly valued park biodiversity than those with high school or below education. How do you think of and interpret this finding?
4. Perceptions of biodiversity and different park styles 4.1 Our previous questionnaire asked you questions on five park characteristics, which are biodiversity, facilities, woodlands, maintenance, and seasonal views. Now, could you please rank these five park characteristics by their importance using numbers 1 to 5? Number 1 as the most important, then numbers 2 and 3, and number 5 the least important. Can you explain why you rank as this? 4.2 Now, I'm going to show you two different images of two different urban parks (spread them out). Taking your time... could you please tell me which one you prefer? Why you prefer this?
5. Potential approaches for promoting both urban biodiversity and public appreciation 5.1 What are your ideas regarding potential practical approaches for promoting both urban biodiversity and public appreciation in China? What is your strategy in terms of these two goals' integration? You could use your working experience to exemplify.
6. Conclusion and thanking the participants

Appendix B-6 List of ecology/landscape professionals interviewed

ID	Expertise field	Occupation	Organisation
Hangzhou			
HZ-PRO-1	Landscape management, ecology	plant official	Hangzhou Municipal Bureau of Garden and Cultural Relics
HZ-PRO-2	Landscape planning and design	Landscape architect	PowerChina Huadong Engineering Design Company
HZ-PRO-3	Landscape planning and design	Landscape architect	Hangzhou Landscape Design Institute
HZ-PRO-4	Landscape planning and design	Landscape architect	Hangzhou Landscape Design Institute
HZ-PRO-5	Urban ecology, ecology, education	plant nature Academic researcher, ecologist	Zhejiang Wilderness Nature Education Institution, Zhejiang Agriculture & Forestry University
Shanghai			
SH-PRO-1	Urban ecology, ecology, education	plant nature Ecologist	Forest City Studio
SH-PRO-2	Landscape research, landscape planning and design	Academic researcher	Shanghai Normal University
SH-PRO-3	Landscape planning and design	Landscape architect	SWA (Shanghai) Group
SH-PRO-4	Landscape planning and design	Landscape architect	AECOM (Shanghai)
SH-PRO-5	Landscape management	Landscape manager	Shanghai Shimao Real Estate Company

Appendix C-Results

Appendix C-1 Statistical tests about differences in utility values

Table C-1: Testing if there were significant differences in utility values between levels in the whole public sample, in the Hangzhou public sample, and in the Shanghai public sample (Note: * $p \leq 0.05$, *** $p \leq 0.001$, WH=Whole public sample, HZ=Hangzhou public sample, SH=Shanghai public sample, SR= Species rich flora and fauna, SM=Species moderate flora and fauna, SP=Species poor flora and fauna, SFRF= Supporting facilities & recreation/play facilities, SFNRF= Supporting facilities, no recreation/play facilities, FF=Few facilities, WD=Wooded areas with dense trees, MO=Mix of some trees and open areas, ST=Sparse trees, WM=Well-maintained, MM=Moderate-maintained, LM=Low maintenance, SPR= Spring flowers, SUM= Summer green canopy trees, AUT= Autumn colourful foliage, WIN= Winter branch-trunk viewing plants/conifer trees)

	Biodiversity		Facilities		Woodlands		Maintenance		Seasonal views		
	SR vs. SM	SM vs. SP	SFRF vs. SFNRF	SFNRF vs. FF	MO vs. WD	WD vs. ST	WM vs. MM	MM vs. LM	AUT vs. SPR	SPR vs. SUM	SUM vs. WIN
Test used	Wilcoxon	Paired Samples T	Wilcoxon	Wilcoxon	Wilcoxon	Wilcoxon	Wilcoxon	Paired Samples T	Paired Samples T	Wilcoxon	Wilcoxon
Results (WH)	Z=-13.630 p=0.000***	t=22.044, p=0.000***	Z=-9.963, p=0.000***	Z=-13.361, p=0.000***	Z=-11.867, p=0.000***	Z=-9.951, p=0.000***	Z=-6.639, p=0.000***	t=20.455, p=0.000***	t=0.555, p=0.579	Z=-7.164, p=0.000***	Z=-10.520, p=0.000***
Test used	Paired Samples T	Paired Samples T	Wilcoxon	Paired Samples T	Paired Samples T	Paired Samples T	Wilcoxon	Paired Samples T	Paired Samples T	Paired Samples T	Wilcoxon
Results (HZ)	t=14.989, p=0.000***	t=17.169, p=0.000***	Z=-7.321, p=0.000***	t=18.095, p=0.000***	t=10.756, p=0.000***	t=8.046, p=0.000***	Z=-4.455, p=0.000***	t=14.075, p=0.000***	t=0.579, p=0.563	t=3.701, p=0.000***	Z=-7.354, p=0.000***
Test used	Paired Samples T	Paired Samples T	Paired Samples T	Wilcoxon	Paired Samples T	Wilcoxon	Wilcoxon	Wilcoxon	Wilcoxon	Wilcoxon	Paired Samples T
Results (SH)	t=14.752, p=0.000***	t=15.367, p=0.000***	t=7.849, p=0.000***	Z=-8.955, p=0.000***	t=11.335, p=0.000***	Z=-7.125, p=0.000***	Z=-5.007, p=0.000***	Z=-9.139, p=0.000***	Z=-0.477, p=0.633	Z=-6.271, p=0.000***	t=9.351, p=0.000***

Appendix C-2 Statistical tests about differences between attribute importances

Table C-2-1: Testing if there were significant differences in average importances between attributes in the whole public sample (** $p \leq 0.001$)

Test used	Wilcoxon	Paired Samples T	Paired Samples T	Paired Samples T
Variables compared	Facilities vs. Species richness	Species richness vs. Maintenance	Maintenance vs. Woodlands	Woodlands vs. Seasonal views
Results	Z=-4.656, p=0.000***	t=0.072, p=0.942	t=0.553, p=0.581	t=10.837, p=0.000***

Table C-2-2: Testing if there were significant differences in average importances between attributes in the Hangzhou public sample (* $p \leq 0.05$, ** $p \leq 0.001$)

Test used	Paired Samples T test	Paired Samples T test	Paired Samples T test	Wilcoxon test
Variables compared	Facilities vs. Species richness	Species richness vs. Maintenance	Maintenance vs. Woodlands	Woodlands vs. Seasonal views
Results	t=0.207, p=0.836	t=2.440, p=0.016*	t=0.680, p=0.498	Z=-6.271, p=0.000***

Table C-2-3: Testing if there were significant differences in average importances between attributes in the Shanghai public sample (** $p \leq 0.001$)

Test used	Paired Samples T	Paired Samples T	Paired Samples T	Paired Samples T
Variables compared	Facilities vs. Maintenance	Maintenance vs. Woodlands	Woodlands vs. Species richness	Species richness vs. Seasonal views
Results	t=3.700, p=0.000***	t=0.067, p=0.947	t=3.769, p=0.000***	t=3.374, p=0.001***

Appendix C-3 Correlations

Table C-3: Correlations between (a) attributes of “species richness” and “seasonal views”, (b) levels of attributes “species richness” and “seasonal views” (*p<=0.05, **p<=0.01, ***p<=0.001)

(a) Attributes “species richness” and “seasonal views”					
		Seasonal views			
Species richness	Whole-PUB				-0.148*
	HZ-PUB				-0.120
	SH-PUB				-0.093
(b) Levels of “species richness” and “seasonal views”					
		Spring flowers	Summer green canopy trees	Autumn colourful foliage	Winter branch-trunk viewing plants/conifer trees
Species rich flora and fauna	Whole-PUB	-0.107	0.208***	-0.251***	0.195***
	HZ-PUB	-0.092	0.225**	-0.289***	0.170*
	SH-PUB	-0.038	0.107	-0.164	0.117
Species moderate flora and fauna	Whole-PUB	-0.097	-0.137*	0.249***	0.054
	HZ-PUB	-0.025	-0.191*	0.346***	-0.001
	SH-PUB	-0.032	-0.150	0.178*	0.037
Species poor flora and fauna	Whole-PUB	0.123*	-0.060	0.070	-0.181**
	HZ-PUB	0.070	-0.047	0.060	-0.163*
	SH-PUB	0.057	0.008	0.025	-0.132

Appendix C-4 Statistical tests about share of preference

Table C-4: Wilcoxon analysis testing the differences between wild parks and the changed ones in terms of share of preference (Note: *** $p \leq 0.001$, WP=Wild park scenario)

		The whole public sample		Hangzhou public sample		Shanghai public sample	
		Z	Sig (2 tailed)	Z	Sig (2 tailed)	Z	Sig (2 tailed)
Changing "biodiversity" level	WP vs. Decreasing biodiversity level to "species moderate flora and fauna"	-12.830	0.000***	-9.470	0.000***	-8.645	0.000***
	WP vs. Decreasing biodiversity level to "species poor flora and fauna"	-14.333	0.000***	-10.357	0.000***	-9.950	0.000***
Changing "facility" level	WP vs. Changing facility level to "supporting & recreation/play facilities"	-9.071	0.000***	-7.153	0.000***	-5.645	0.000***
	WP vs. Changing facility level to "few facilities"	-12.793	0.000***	-9.653	0.000***	-8.387	0.000***
Changing "woodlands" level	WP vs. Changing woodland level to "mix of some trees and open areas"	-10.811	0.000***	-7.453	0.000***	-7.848	0.000***
	WP vs. Changing woodland level to "sparse trees"	-8.387	0.000***	-6.548	0.000***	-6.548	0.000***
Changing "maintenance" level	WP vs. Improving maintenance level to "moderate maintained, less neat-looking"	-11.790	0.000***	-8.673	0.000***	-8.012	0.000***
	WP vs. Improving maintenance level to "well-maintained, neat-looking"	-11.267	0.000***	-7.845	0.000***	-8.084	0.000***

Appendix C-5 Statistical tests between different groups

Subgroup differences: Note: in tables, * $p \leq 0.05$, ** $p \leq 0.01$, *** $p \leq 0.001$

Appendix C-5-1: Gender

(1) Average importance of attributes

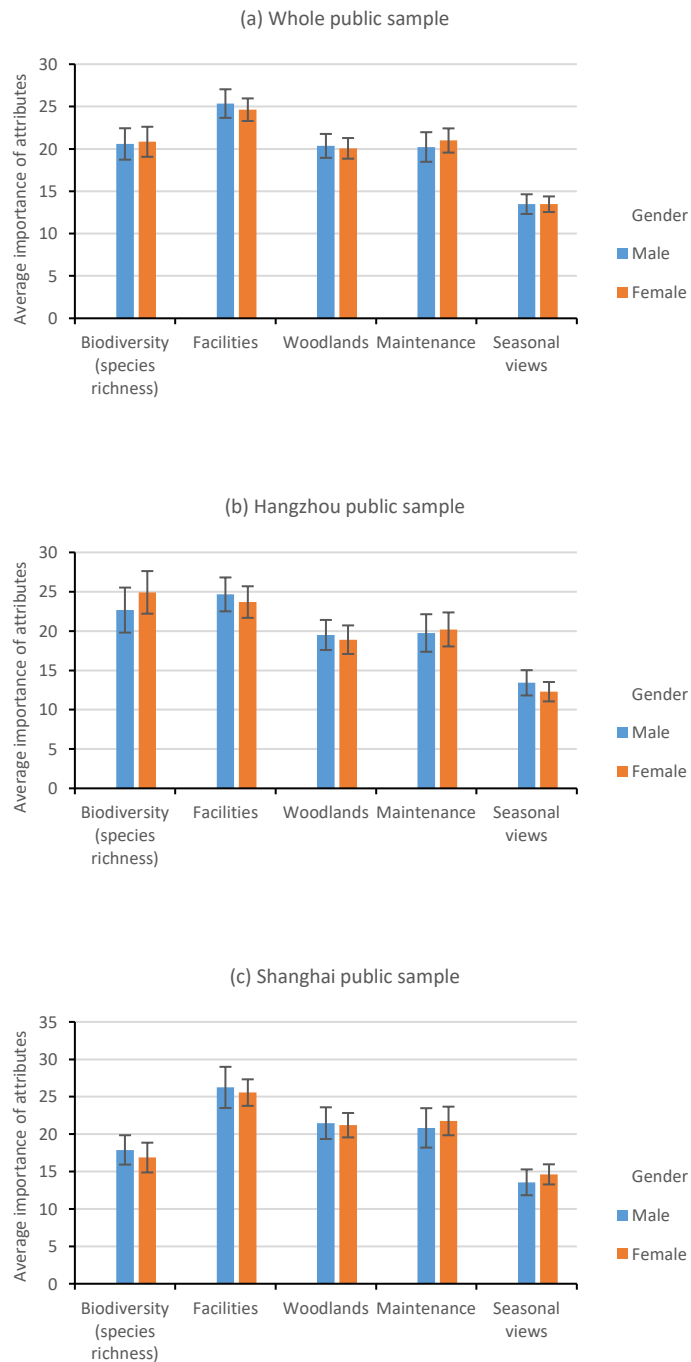


Figure C-5-1-1: Average importances of five attributes by gender

Table C-5-1-1: Testing if there were significant differences regarding each attribute importance between males and females among public respondents

	Species richness	Facilities	Woodlands	Maintenance	Seasonal views
<i>The total public sample</i>					
Test	Independent Samples T	Independent Samples T	Mann Whitney	Mann Whitney	Mann Whitney
Result	T=-0.195, p=0.845	T=0.672, p=0.502	Z=-0.524, p=0.600	Z=-0.688, p=0.491	Z=-0.340, p=0.734
<i>The Hangzhou public sample</i>					
Test	Independent Samples T	Independent Samples T	Mann Whitney	Independent Samples T	Mann Whitney
Result	T=-1.139, p=0.256	T=0.660, p=0.510	Z=-0.659, p=0.510	T=-0.280, p=0.780	Z=-0.935, p=0.350
<i>The Shanghai public sample</i>					
Test	Mann Whitney	Independent Samples T	Mann Whitney	Independent Samples T	Mann Whitney
Result	Z=-1.159, p=0.246	T=0.444, p=0.658	Z=-0.128, p=0.898	T=-0.582, p=0.561	Z=-1.200, p=0.230

(2) Share of preference

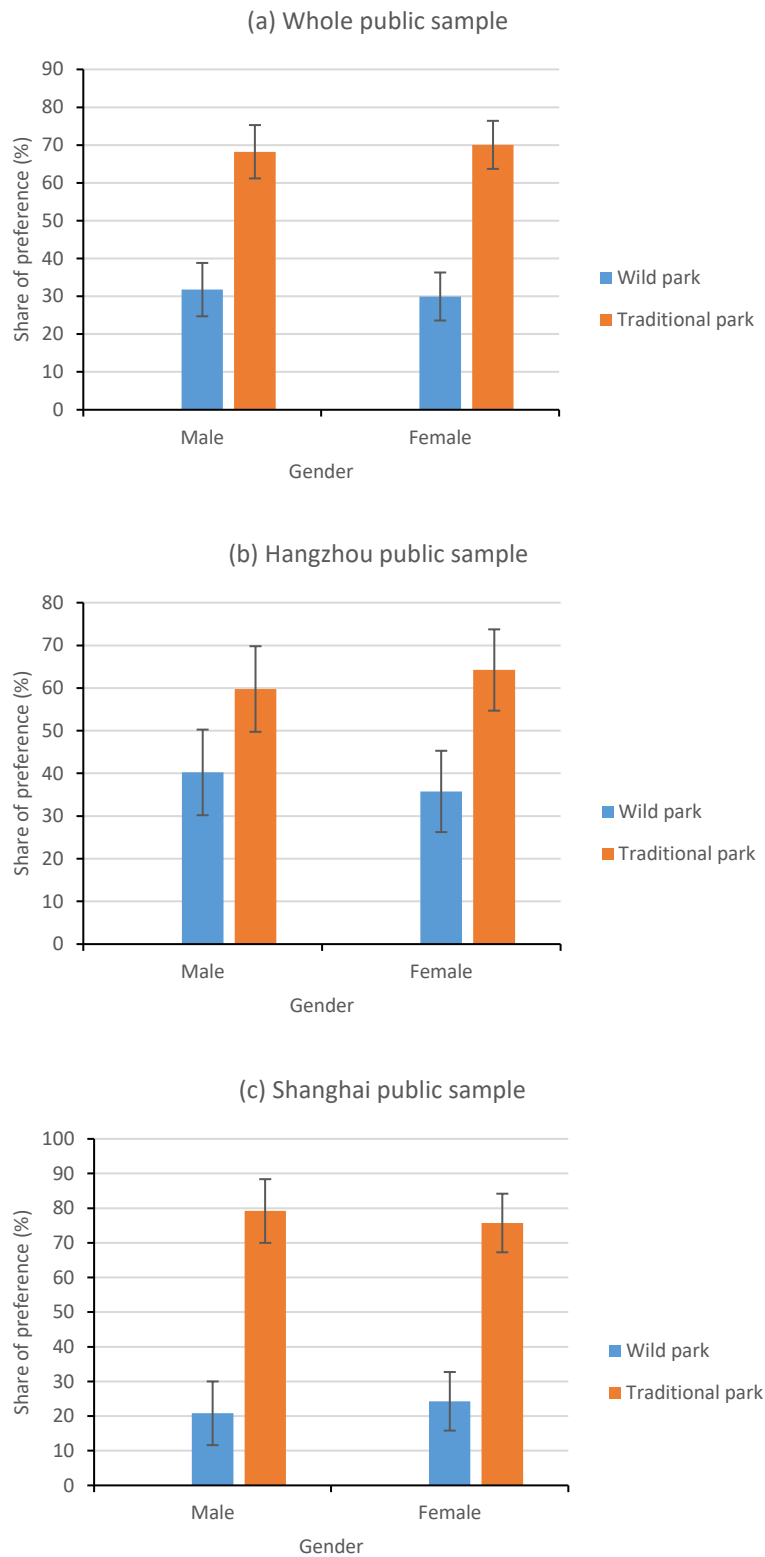


Figure C-5-1-2: Share of preference for wild and traditional park scenarios by gender

Table C-5-1-2: Wilcoxon test for differences in share of preference for the two park scenarios among each gender group (Note: * $p \leq 0.05$, *** $p \leq 0.001$)

	Male	Female
<i>Whole public sample</i>		
Z	-4.865	-5.556
Sig. (2-tailed)	0.000***	0.000***
<i>Hangzhou public sample</i>		
Z	-2.309	-2.546
Sig. (2-tailed)	0.021*	0.011*
<i>Shanghai public sample</i>		
Z	-4.723	-5.151
Sig. (2-tailed)	0.000***	0.000***

Table C-5-1-3: Mann Whitney U testing if there were significant differences regarding share of preference for each scenario between males and females among public respondents

	Share of preference for the wild park scenario	Share of preference for the traditional park scenario
<i>Whole public sample</i>		
Z	-0.470	-0.470
Sig. (2-tailed)	0.639	0.639
<i>Hangzhou public sample</i>		
Z	-0.047	-0.047
Sig. (2-tailed)	0.963	0.963
<i>Shanghai public sample</i>		
Z	-0.623	-0.623
Sig. (2-tailed)	0.533	0.533

Appendix C-5-2: Childhood living environment

(1) Average importances of attributes

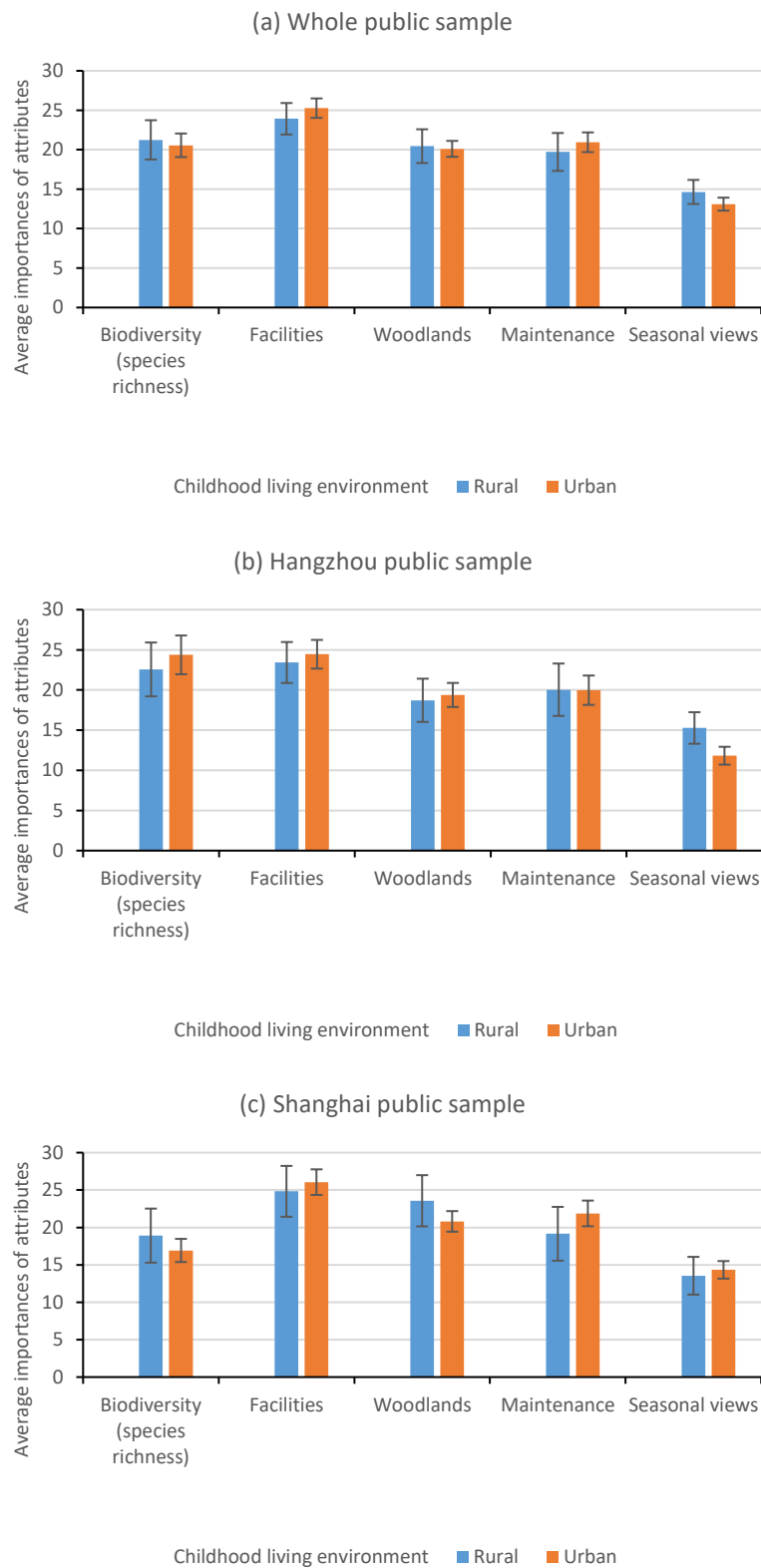


Figure C-5-2-1: Average importances of five attributes by childhood living environment

Table C-5-2-1: Testing if there were significant differences between childhood living environment groups regarding each attribute importance

	Species richness	Facilities	Woodlands	Maintenance	Seasonal views
<i>The total public sample</i>					
Test	Mann Whitney	Independent Samples T	Mann Whitney	Mann Whitney	Mann Whitney
Result	Z=-0.779, p=0.436	T=-1.081, P=0.281	Z=-0.241, p=0.809	Z=-0.987, p=0.324	Z=-2.059, p=0.039*
<i>The Hangzhou public sample</i>					
Test	Independent Samples T	Mann Whitney	Mann Whitney	Mann Whitney	Mann Whitney
Result	T=-0.836, p=0.405	Z=-0.609, p=0.543	Z=-0.903, p=0.367	Z=-0.115, p=0.908	Z=-3.577, p=0.000***
<i>The Shanghai public sample</i>					
Test	Independent Samples T	Independent Samples T	Independent Samples T	Independent Samples T	Mann Whitney
Result	T=1.070, p=0.287	T=-0.617, p=0.538	T=1.649, p=0.102	T=-1.347, p=0.180	Z=-0.462, p=0.644

(2) Share of preference

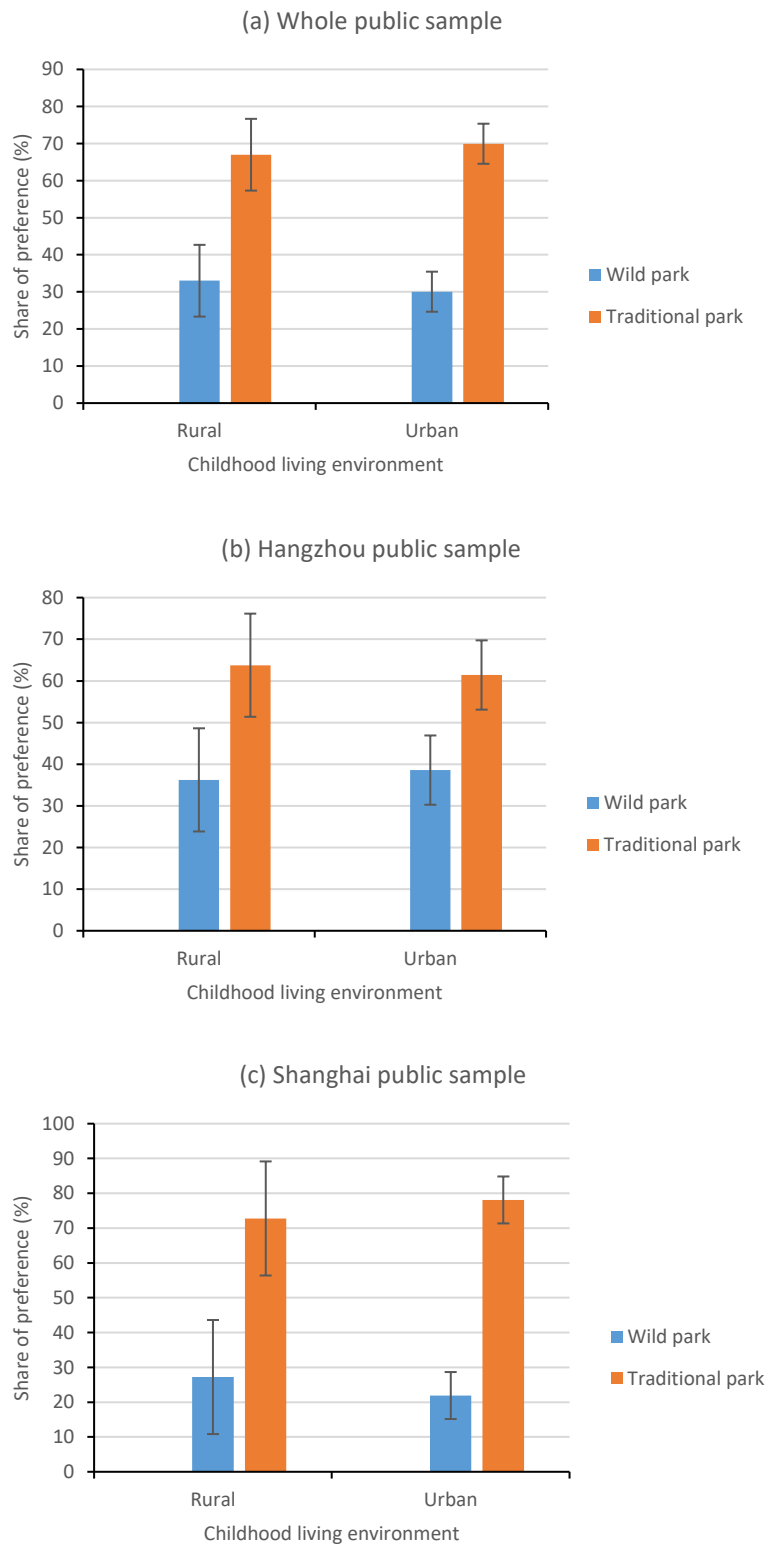


Figure C-5-2-2: Share of preference for wild and traditional park scenarios by childhood living environment

Table C-5-2-2: Wilcoxon test for differences in share of preference for the two park scenarios among each childhood living environment group

	Rural	Urban
<i>Whole public sample</i>		
Z	-3.217	-6.672
Sig. (2-tailed)	0.001***	0.000***
<i>Hangzhou public sample</i>		
Z	-2.065	-2.902
Sig. (2-tailed)	0.039*	0.004**
<i>Shanghai public sample</i>		
Z	-2.686	-6.375
Sig. (2-tailed)	0.007**	0.000***

Table C-5-2-3: Mann Whitney U testing if there were significant differences regarding share of preference for each scenario between two childhood living environment groups

	Share of preference for the wild park scenario	Share of preference for the traditional park scenario
<i>Whole public sample</i>		
Z	-1.046	-1.046
Sig. (2-tailed)	0.296	0.296
<i>Hangzhou public sample</i>		
Z	0.892	0.892
Sig. (2-tailed)	-0.136	-0.136
<i>Shanghai public sample</i>		
Z	-0.796	-0.796
Sig. (2-tailed)	0.426	0.426

Appendix C-5-3: Residential context

(1) Average importances of attributes

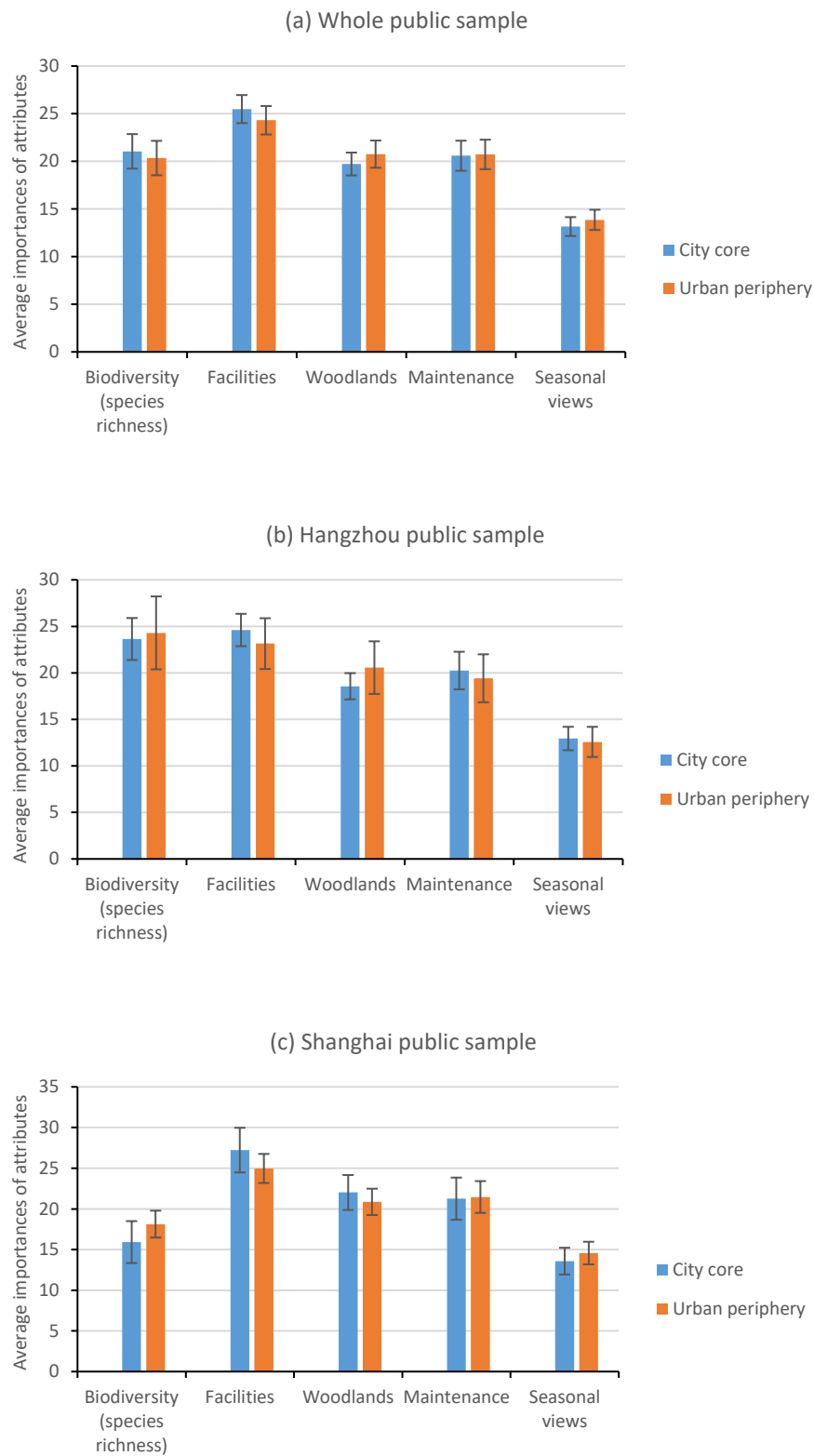


Figure C-5-3-1: Average importances of park attributes according to residential context

Table C-5-3-1: Testing if there were significant differences of attributes' importance values according to residential context

	Species richness	Facilities	Woodlands	Maintenance	Seasonal views
<i>The total public sample</i>					
Test	Mann Whitney	Mann Whitney	Independent Samples T	Mann Whitney	Mann Whitney
Result	Z=-0.606, p=0.545	Z=-1.284, p=0.199	t=-1.106, p=0.270	Z=-0.004, p=0.996	Z=-0.966, p=0.334
<i>The Hangzhou public sample</i>					
Test	Independent Samples T	Independent Samples T	Independent Samples T	Independent Samples T	Mann Whitney
Result	t=-0.309, p=0.758	t=0.921, p=0.359	t=-1.270, p=0.208	t=0.482, p=0.630	Z=-0.109, p=0.914
<i>The Shanghai public sample</i>					
Test	Mann Whitney	Independent Samples T	Mann Whitney	Independent Samples T	Mann Whitney
Result	Z=-1.851, p=0.064	t=1.440, p=0.152	Z=-0.838, p=0.402	t=-0.128, p=0.899	Z=-0.777, p=0.437

(2) Share of preference

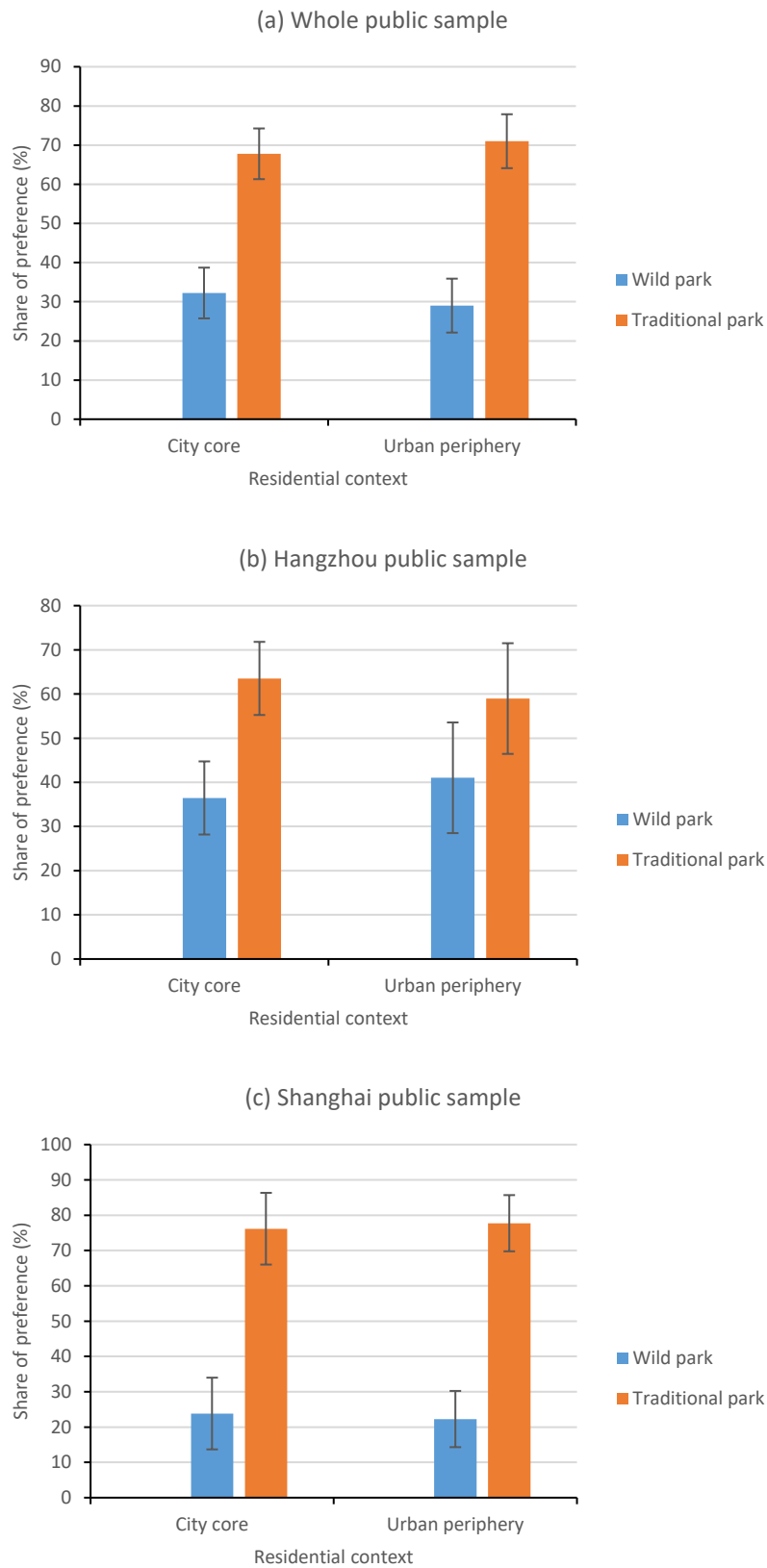


Figure C-5-3-2: Share of preference for wild and traditional park scenarios by residential context

Table C-5-3-2: Wilcoxon test for differences in share of preference for the two park scenarios among each residential context group

	City core	Urban periphery
<i>Whole public sample</i>		
Z	-5.307	-5.144
Sig. (2-tailed)	0.000***	0.000***
<i>Hangzhou public sample</i>		
Z	-3.393	-1.284
Sig. (2-tailed)	0.001***	0.199
<i>Shanghai public sample</i>		
Z	-4.256	-5.471
Sig. (2-tailed)	0.000***	0.000***

Table C-5-3-3: Mann Whitney U testing if there were significant differences regarding share of preference for each scenario between two groups among public respondents

	Share of preference for the wild park scenario	Share of preference for the traditional park scenario
<i>Whole public sample</i>		
Z	-0.133	-0.133
Sig. (2-tailed)	0.894	0.894
<i>Hangzhou public sample</i>		
Z	-0.873	-0.873
Sig. (2-tailed)	0.383	0.383
<i>Shanghai public sample</i>		
Z	-0.379	-0.379
Sig. (2-tailed)	0.704	0.704

Appendix C-6 Regression

Table C-6-1: Hierarchical multiple regression (HMR) testing the factor of age for predicting the perceived importance of the attribute “species richness,” controlling for ecological-related knowledge/interest, education, and city (HZ=Hangzhou, SH=Shanghai, HS=High school or below, JC=Junior college, UG=Undergraduate degree, PG=Postgraduate degree or higher, * $p \leq 0.05$, ** $p \leq 0.01$, *** $p \leq 0.001$)

Model	R Square	Change Statistics			ANOVA	
		R Square Change	F Change	Sig. F Change	F	Sig.
1	0.144	0.144	9.239	0.000***	9.239	0.000***
2	0.146	0.001	0.201	0.818	6.618	0.000***
Coefficients						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	18.000	1.270		14.170	0.000
	No related knowledge vs. Have related knowledge	6.280	1.990	0.189	3.156	0.002**
	UG vs. HS	-3.109	1.573	-0.126	-1.976	0.049*
	UG vs. JC	0.076	1.653	0.003	0.046	0.964
	UG vs. PG	-1.104	1.918	-0.037	-0.576	0.565
	SH vs. HZ	5.608	1.246	0.258	4.503	0.000***
2	(Constant)	17.521	1.499		11.685	0.000
	No related knowledge vs. Have related knowledge	6.069	2.025	0.183	2.996	0.003**
	UG vs. HS	-3.028	1.870	-0.123	-1.619	0.107
	UG vs. JC	0.159	1.736	0.006	0.092	0.927
	UG vs. PG	-1.275	1.947	-0.043	-0.655	0.513
	SH vs. HZ	5.642	1.274	0.260	4.429	0.000***
	Middle-aged vs. Younger adults	0.996	1.586	0.043	0.628	0.530
	Middle-aged vs. Older	0.470	1.699	0.020	0.277	0.782

Table C-6-2: Hierarchical multiple regression (HMR) testing the factor of education for predicting the perceived importance of the attribute “species richness,” controlling for age, ecological-related knowledge/interest, city (HZ=Hangzhou, SH=Shanghai, HS=High school or below, JC=Junior college, UG=Undergraduate degree, PG=Postgraduate degree or higher, **p<=0.01, ***p<=0.001)

Model	R Square	Change Statistics			ANOVA	
		R Square Change	F Change	Sig. F Change	F	Sig.
1	0.133	0.133	10.590	0.000***	10.590	0.000***
2	0.146	0.012	1.279	0.282	6.618	0.000***
Coefficients						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	16.831	1.293		13.017	0.000
	No related knowledge vs. Have related knowledge	5.949	1.956	0.179	3.041	0.003**
	SH vs. HZ	5.791	1.260	0.267	4.597	0.000***
	Middle-aged vs. Younger adults	1.118	1.539	0.048	0.727	0.468
	Middle-aged vs. Older	-0.659	1.508	-0.029	-0.437	0.663
2	(Constant)	17.521	1.499		11.685	0.000
	No related knowledge vs. Have related knowledge	6.069	2.025	0.183	2.996	0.003**
	SH vs. HZ	5.642	1.274	0.260	4.429	0.000***
	Middle-aged vs. Younger adults	0.996	1.586	0.043	0.628	0.530
	Middle-aged vs. Older	0.470	1.699	0.020	0.277	0.782
	UG vs. HS	-3.028	1.870	-0.123	-1.619	0.107
	UG vs. JC	0.159	1.736	0.006	0.092	0.927
	UG vs PG	-1.275	1.947	-0.043	-0.655	0.513

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