Public Perception of and Preference for Designed Naturalistic Urban Plantings in Beijing, China

By

Kewei Chen

A Thesis for the Degree of Doctor of Philosophy

Department of Landscape

University of Sheffield

August 2023

Acknowledgements

I am profoundly grateful to the University of Sheffield for providing me with the opportunities, resources, and infrastructure that have enabled me to pursue this research. The past eight years spent here, beginning with my master's degree, have been nothing short of delightful.

My heartfelt appreciation extends to my current supervisors, Dr Helen Hoyle and Dr Nicola Dempsey, and my retired previous supervisors, Professor James Hitchmough and Professor Anna Jorgensen. Their invaluable guidance, insights, and support have been the cornerstones of my doctoral journey. Helen's conscientiousness and responsibility, Nicola's warmth and thoughtful kindness, James's visionary 'big picture' perspective, and Anna's unwavering encouragement have left indelible memories on my path. Their expertise, support, and constructive feedback have profoundly shaped the direction of my research and significantly contributed to both my academic and personal growth, which will continue throughout my life. I also extend my gratitude to Dr. Jean Russell for her invaluable statistical support, which has been integral to this work.

My deepest appreciation goes out to the 1,600 participants and 47 interviewees of my survey, whose willingness to share their experiences and perspectives has enriched the fabric of my study. Special thanks are also owed to Professor Li Dong, Wenting Yang, and Hongxia Yi from Beijing Forest University for their invaluable support during the Beijing EXPO survey.

I wish to convey my heartfelt thanks to my friends and colleagues from both the Landscape and Architecture Departments on Floor 9 in the Arts Tower, whose insightful discussions, delicious treats, and convivial research environment have significantly contributed to the refinement of my work.

Lastly, my appreciation knows no bounds when it comes to my dear parents, Mr. Jiaxin Chen (陈家新先生) and Mrs. Xiaoyan Chen (陈晓艳女士), whose unwavering support and financial assistance have been crucial throughout my research journey. To my dear husband, Dr. Lizhe Wang, your support and guidance played a vital role in shaping my path as a capable PhD scholar. To all my other family members and friends, your encouragement and support have been a steadfast anchor during challenging times.

To everyone mentioned and those who have contributed, no matter how insignificantly, to the completion of this thesis, I offer my deepest and most heartfelt thanks. Your support, encouragement, and contributions have elevated this journey, making it meaningful, special, and profound.

Abstract

Naturalistic plantings provide environmental and human well-being benefits and have become increasingly popular in many parts of the world, particularly in Europe and North America. China, a major carbon emitter with a mission to achieve carbon neutrality, is gradually recognizing the ecological benefits of naturalistic plantings in promoting sustainable environmental improvement. In recent years, naturalistic plantings have been introduced in major Chinese cities such as Beijing and Chengdu. If this approach is to be upscaled to deliver environmental and wellbeing effects across China, there is an urgent need for a greater understanding of the level of acceptance of naturalistic planting design amongst the Chinese public. This study aimed to explore public perceptions of and preferences for designed naturalistic planting design in Beijing, China to inform future urban landscape design and management throughout China. An on-site questionnaire was conducted with 1600 participants who were visiting national nature reserves, urban parks, and EXPO show gardens in Beijing. Semi-structured, in-depth interviews were then carried out online or on-site with a sub-set of 47 interviewees. Our results show that most respondents recognized and defined nature according to the degree of human intervention and the scale of a scene. Respondents surveyed in urban parks perceived designed naturalistic urban plantings, more positively than conventional Chinese planting design. They recognized and appreciated naturalistic plantings for their ecological values, enjoyment, and fitness, as well as acknowledging the perception of disorder and unsafety in small-scale design show gardens. We identified relationships between respondents' gender, age, education level, income and professional background and their preference for designed naturalistic urban plantings. Our study contributes to the growing body of research on urban plantings and provides valuable insights for urban planners and greenspace designers in China. By harnessing the preferred planting characteristics identified in our study, urban planners and designers can shape greener, more sustainable environments that effectively address the challenges of urbanization while creating harmonious spaces that benefit both urban residents and the ecosystem.

Content

Acknowledgements ..... **i**
Abstract ..... **ii**
Content ..... **iii**
List of Tables ..... **vi**
List of Figures ..... **x**
| Chapter 1 : Introduction **12**
1.1. Background to the research 12
1.2. Research gaps 14
1.3. Research aim and questions 15
1.4. Thesis structure 16
| Chapter 2 : Literature Review **18**
2.1. Urban nature and naturalistic landscape design 18
2.1.1. Introduction to nature and urban nature 18
2.1.2. Introduction to naturalistic planting design 20
2.1.3. Benefits of urban nature and naturalistic planting 22
2.2. Nature in Chinese culture 25
2.2.1. Nature in ancient China (before 1840) 25
2.2.2. Nature in modern and contemporary China (after 1840) 31
2.3. Perceptions of and preferences for naturalistic landscapes in urban areas 33
2.3.1. Definition of landscape perception and preference 33
2.3.2. Aesthetic characteristics of naturalistic planting 35
2.3.3. Cultural background and socio-demographic factors 38
2.3.4. Current Chinese research on urban greenspaces and landscape perception and preference: Identifying the gaps 42
2.4. Methodological approaches to public perception and preference 47
2.5. Summary 49
| Chapter 3 : Methodology **50**
3.1. Selection of the landscapes used in the research 51
3.1.1. Research Site 1: Baihua Mountain National Nature Reserve (BM) 56
3.1.2. Research Site 2: Lotus Lake Park (LLP) 58

3.1.3. Research Site 3: Expo 2019 Beijing (EXPO) 63
3.2. Quantitative survey 68
3.2.1. Questionnaire design 69
3.2.2. Sampling strategy and questionnaire survey procedure 71
3.2.3. Statistical techniques used in the quantitative analysis 72
3.3. Qualitative survey 75
3.3.1. Interview design 75
3.3.2. Sampling strategy and interview survey procedure 78
3.3.3. Statistical techniques used in the qualitative analysis 80
3.4. Summary 80
| Chapter 4 : Results 81
4.1. Introduction and structure of the results 81
4.2. Participants' socio-demographic characteristics 82
4.3. Research Question 1: How do Chinese greenspace users recognise and define 'nature'? 91
4.3.1. Frequency of and Reasons for visiting nature, and preferred types of 'nature' 91
4.3.2. Representative and definition of nature to the greenspace users 95
4.3.3. Perceptions of vegetation in real nature 105
4.3.4. Concerns about nature 111
4.3.5. Nature relatedness 115
4.3.6. Interest in nature and childhood nature experience 118
4.4. Research Question 2: How do Chinese greenspace users recognise and evaluate 'urban greenspace'? 126
4.4.1. Thoughts on the relationship between the city and nature 126
4.4.2. Attitude to urban nature 129
4.4.3. Beliefs and values related to the urban environment 135
4.5. Research Question 3: How do greenspace users perceive naturalistic planting in urban areas? 138
4.5.1. Comparison between naturalistic (NP) and conventional plantings (CP) in urban park scale 138
4.5.2. Comparison between naturalistic (NP) and conventional plantings (CP) in show garden scale. 147
4.5.3. Comparison between real nature (BM) and NP in the urban park (WP) and show garden (NSR) 161
4.5.4. Perceived and preferred characteristics of naturalistic planting (NP) 163
| Chapter 5 : Discussion 176
5.1. Research Question 1: How do Chinese greenspace users recognise, define and perceive 'nature'? 177
5.1.1. Participant patterns of using nature 177
5.1.2. Representation and definition of nature 180
5.1.3. Concerns about nature 187
5.1.4. The role of Chinese culture 189

5.1.5. Summary for Research Question 1 190
5.2. Research Question 2: How do Chinese greenspace users recognise and evaluate 'urban greenspace'? 191
5.2.1. Recognition of the relationship between the 'city' and 'nature' 191
5.2.2. Greenspace users' attitudes towards urban nature 193
5.2.3. Beliefs and values related to the urban environment 195
5.2.4. Summary for Research Question 2 196
5.3. Research Question 3: How do greenspace users perceive naturalistic planting in urban areas? 197
5.3.1. Comparison between Naturalistic Planting (NP) and Conventional Planting (CP) 197
5.3.2. Comparison of reactions to real nature in Baihua Mountain Nature Reserve and Naturalistic Planting (NP) 202
5.3.3. The key preferred characteristics of naturalistic planting (NP) 203
5.3.4. Summary for Research Question 3 208
5.4. Research Question 4: Are greenspace users' beliefs, values and socio-demographic factors drivers of responses to nature, urban nature and naturalistic plantings? 209
5.4.1. The role of beliefs and values related to the urban environment 209
5.4.2. The role of gender 210
5.4.3. The role of age 212
5.4.4. The role of education 213
5.4.5. The role of profession 214
5.4.6. The role of childhood experience and living place 215
5.4.7. The role of income and employment status 216
5.4.8. The role of religion 217
5.4.9. Summary for Research Question 4 217
| Chapter 6 : Conclusions and Implications for Policy, Practice and Further Research 219
6.1. Research Overview and conclusions 219
6.2. Limitations 222
6.3. Contribution to knowledge 223
6.4. Practical implication 224
6.5. Scope for further research 226
| Chapter 7 : References 228
| Chapter 8 : Appendix 255

List of Tables

Table 2.1 Typology and examples of benefits of interacting with nature in research: Keniger et al. (2013) findings and subsequent findings. (Middle column: examples derived from research; right column: examples published post 2013 and summarized by author)....23
Table 2.2 Each feature and its interpretation for two research on preference....35
Table 3.1 Research questions, sub-themes, survey sites and survey methods....50
Table 3.2 Framework for categorisation of research sites: Five research sites selected in two dimensions of vegetation community types and scale....52
Table 3.3 Specific category of three types of vegetation communities and detailed typology description....53
Table 3.4 Specific category of three scales/scenarios and detailed typology description....54
Table 3.5 Dominant species within the typical plant communities in BM (Zhang *et al.*, 2020)....57
Table 3.6 Main Species used in the WP....61
Table 3.7 Main plants used in the TP and rest areas in the LLP (excluding the WP)....62
Table 3.8 Main Species used in tree, shrub and herbaceous layers in the NSR garden....64
Table 3.9 Main Species used in tree, shrub and herbaceous layers in the whole Beijing Garden....66
Table 3.10 Summary of the research sites in relation to the viewshed diversity, plant species diversity per square metre, evaluation of providing wildlife habitat types and the percentage of coloured 'green' space in summer and autumn....67
Table 3.11 General questionnaire structure: the main themes and detailed questions....69
Table 3.12 Description and explanation of variables used in subsequent chapters....70
Table 3.13 Summary of sample size and survey time for each site....72
Table 3.14 the main themes and detailed questions of the BM interviews....76
Table 3.15 the main themes and detailed questions of the LLP interviews....77
Table 3.16 the main themes and detailed questions of the EXPO interviews....77
Table 3.17 the main themes and detailed questions of stakeholders' interviews....78
Table 3.18 Summary of sample size and survey time for each site of follow-up and stakeholder interviews....79
Table 4.1 The structure of the result chapter highlighting the integration of questionnaire and interview results to address research sub-questions and the three main research questions....81
Table 4.2 Summary of data collection....82

Table 4.3 Questionnaire participants: Socio-demographic profile (% of total N) 85
Table 4.4 Detailed Socio-demographic profile of the interviewees in the BM, LLP and EXPO surveys 87
Table 4.5 Interview participants: Socio-demographic profile (% of total N) 89
Table 4.6 Six sub-themes consisting of questionnaire and interview results for answering the research question 1 91
Table 4.7 Effect of the demographic variables on the frequency of visiting nature 92
Table 4.8 Diagrams, explanations, and the mean score for four reasons in the questionnaire 92
Table 4.9 Effect of the demographic variables on the four reasons 93
Table 4.10 Frequency of choosing pictures as the representation of nature 95
Table 4.11 Themes of interviews about the definition of nature 98
Table 4.12 The loading of individual attitudinal variables onto specific factors 106
Table 4.13 Effect of the seasons and socio-demographic variables on the perceptual components 106
Table 4.14 Correction between perceptual components and the variables in relation to overall impression score on vegetation, participants' NR scores, and other participants' background information 107
Table 4.15 Effect of the demographic variables on the participants' overall impression score on vegetation in real nature 108
Table 4.16 Correction between overall impression score on vegetation and perceptual components, participants' NR scores, and other participants' background information 109
Table 4.17 Component loadings from PCA with varimax rotation for individual concerns variables 111
Table 4.18 Mean scores for three 'concerns' principal components and the contained specific question variables 111
Table 4.19 Effect of the seasons, background, and demographic variables on the 'concerns' principal components 112
Table 4.20 Correlation between the concerning component, perceptual and background variables 113
Table 4.21 Mean score of the NR-6 score for overall 1600 participants and each research site 116
Table 4.22 Effect of the demographic variables on the participants' NR-6 score 116
Table 4.23 Correlation between participants' NR-6 score and the perceptual components, overall impression score on natural vegetation, and concerning components 116
Table 4.24 Mean score of sources variables of interest in nature 118
Table 4.25 The loading of individual interest variables onto specific factors 118
Table 4.26 Effect of the site, season and demographic variables on the two interest factors 119
Table 4.27 Correlation between the interest factors and background variables 120
Table 4.28 Open answers in the questionnaire provided by participants 121
Table 4.29 Three sub-themes consisting of questionnaire and interview results for answering research question 2 126

Table 4.30 Summary of themes discussing the benefits of establishing nature in cities 129
Table 4.31 Summary of themes discussing the challenges and concerns about establishing nature in cities....131
Table 4.32 Preferred characteristics and features of urban greenspace 134
Table 4.33 Mean and ANOVA results of questions about beliefs and values related to the urban environment 135
Table 4.34 The loading of environmental paradigm variables onto specific factors (N=600) 136
Table 4.35 Effect of the background and socio-demographic variables on the environmental paradigm components.....136
Table 4.36 Correlation between the environmental paradigm component and NR-6, interests, and background variables.....137
Table 4.37 Four sub-themes consisting of questionnaire and interview results for answering the research question 3 138
Table 4.38 The loading of individual attitudinal variables onto specific factors.....139
Table 4.39 Effect of the plantings, seasons variables on the perceptual components.....140
Table 4.40 Effect of the background and socio-demographic variables on the perceptual components in the Naturalistic Planting (NP) in WP (N=400) 140
Table 4.41 Effect of the background and socio-demographic variables on the perceptual components of Conventional Planting (CP) in TP (N=200) 141
Table 4.42 The effect of the planting and seasons variables on participants' overall impression scores 144
Table 4.43 The effect of the background and demographic variables on participants' overall impression scores for the NP and CP 144
Table 4.44 Correlation between the overall impression scores (overall, NP and CP) and components of perceptions, interests, beliefs and values 145
Table 4.45 The loading of individual attitudinal variables onto specific factors.....148
Table 4.46 Effect of the plantings, seasons variables on the perceptual components.....149
Table 4.47 Effect of the background and socio-demographic variables on the perceptual components in the Naturalistic Planting (NP) in the NSR (N=400) 149
Table 4.48 Effect of the background and socio-demographic variables on the perceptual components in the Conventional Planting (CP) in the BG (N=400) 150
Table 4.49 The effect of the planting and seasons variables on participants' overall impression scores 153
Table 4.50 The effect of the background and demographic variables on participants' overall impression scores for NSR and BJ.....154
Table 4.51 Correlation between the overall impression scores (overall, NP and CP) and components of perceptions, interests, beliefs and values 155
Table 4.52 Terms and frequencies of the most favoured (left) and least favoured (right) aspects of the NP.....157

Table 4.53 Terms and frequencies of the most favoured (left) and least favoured (right) aspects of the CP 158
Table 4.54 Mean and ANOVA result between real nature (BM), naturalistic planting in the urban park (WP) and naturalistic planting show garden (NSR) on the overall impression score and each planting's characteristics ..162
Table 4.55 Mean and ANOVA result between real nature, naturalistic planting (NP) and conventional planting (CP) on overall impression score and each planting's characteristics 163
Table 4.56 Correlation among characteristics of naturalistic planting, grouped in main themes order 164
Table 5.1 The structure of the discussion chapter.....176

List of Figures

Figure 1.1 Geography map of China (https://www.worldometers.info/maps/china-map/) 13
Figure 1.2 Research framework diagram and research questions 16
Figure 2.1 The chronological analysis of the types of Chinese gardens in Tceluiko's research (2019). 27
Figure 2.2 Example of Shanshui literature in form of couplet(a), inscribed board(b), stele(c), plaque(d) and stone(e) 30
Figure 2.3 Influences in the perception process, the model used in Craik's research (1983,1986). 34
Figure 2.4 A planting design case in China. The colours of the planting are mainly red and yellow (photographed by the author in 2019) 37
Figure 2.5 Photos used in the Liu's research (Liu, 2010) 44
Figure 2.6 Photos of the current landscape in Baiyun Mountain Park (https://www.tripadvisor.co.uk/Attraction_Review-g298555-d490438-Reviews-Baiyun_Mountain-Guangzhou_Guangdong.html) 45
Figure 2.7 Photos used in Wang, Zhao and Liu's research: Urban green space (top) and forest (bottom) (Wang, Zhao and Liu, 2016) 46
Figure 3.1 Map of Beijing City and the location of each research site (Map was remade based on Zhao *et al.* (2013)) 55
Figure 3.2 Summer and autumn scene on the main path up to the summit of Baihua Mountain (top two images – summer, bottom two images – autumn) 56
Figure 3.3 Map of the Lotus Lake Park (LLP) 59
Figure 3.4 Summer and autumn scenes on the same location in the WP 60
Figure 3.5 Summer and autumn scenes in the same location in the TP 62
Figure 3.6 Summer and autumn scenes in the same location in the NSR garden 64
Figure 3.7 Summer and autumn scenes of research area in the same location in the BG 66
Figure 3.8 Coloured 'green' space calculation 68
Figure 4.1 Frequency of visiting nature (n=1000, 200 in BM and 800 in EXPO) 91
Figure 4.2 Type of 'natural' areas that the EXPO participants most prefer to visit (N=800) 94
Figure 4.3 Image 3 with 72.9% of participants selection(left) and image 2 with 71.1% of participants selection (right) 96

Figure 4.4 Image 6 with 54.1% of participants selection (left) and image 1 with 25.3% of participants selection (right) 96
Figure 4.5 Image 5 with 23.6% of participants selection (left) and image 4 with 8.9% of participants selection (right) 97
Figure 4.6 Images used in the online interview survey, including Image 1 of nature (left), Image 2 of naturalistic planting (middle) and Image 3 of Chinese conventional planting (right) 159
Figure 4.7 166
Figure 4.8 Sankey diagram for responses of messiness and its acceptances towards NP in EXPO interview survey 168
Figure 5.1 Photos of NP (left) in Woodland Park and CP (right) in Traditional Park in Lotus Lake Park 198
Figure 5.2 Photos of NP in the 'New Silk Road' Garden and CP in the Beijing Garden at EXPO 200
Figure 5.3 Photos of real nature in Baihua Mountain Nature Reserve (left column), NP in Woodland Park (middle column)and NP in 'New Silk Road' Garden (right column) 202

| Chapter 1 : Introduction

1.1. Background to the research

China, as a rapidly developing country, has achieved significant accomplishments in urban construction. However, this progress has been accompanied by notable environmental challenges such as air quality issues and urban waterlogging, and pressing concerns for the health and well-being of urban residents. As China undergoes rapid urbanization, there is a growing need for a forward-looking ecological strategy that prioritizes well-being and carries profound implications for national development.

In response to the urgency of addressing global climate change, a pivotal slogan emerged in 2017, emphasizing the imperative of 'harmonious coexistence of human beings with nature'. Building upon this, in 2020, the Chinese government announced 2020 ambitious goals of peaking carbon dioxide emissions by 2030 and achieving carbon neutrality by 2060. One of the strategies for urban ecological construction involves extensive land greening to enhance ecosystem functionality and carbon sequestration z(National Energy Conservation Center, 2021).

Urban planting design, a crucial component of urban ecological construction, must integrate ecological criteria into the urban fabric. This entails creating sustainable designs with low maintenance requirements, diverse vegetation, seasonal interest, optimal wildlife habitat provisions, and landscape aesthetics (Hitchmough, 2017b; Dunnett, 2019). Over the past decades, the paradigm of naturalistic planting design has emerged as a cornerstone of ecological approaches in urban landscape design in Western countries such as the United Kingdom, Germany, the Netherlands, and North America (Dunnett and Hitchmough, 2004; Priego, Breuste and Rojas, 2008; Dunnett, 2019). Extensive research has spotlighted its ecological, physical, and psychological benefits intrinsic to nature-inspired plantings, demonstrating its feasibility and widespread acceptance among the public in urban planting design (Özgüner and Kendle, 2006; Hoyle, Hitchmough and Jorgensen, 2017a; Maple and Morris, 2018; Alizadeh and Hitchmough, 2020).

Figure 1.1 Geography map of China (https://www.worldometers.info/maps/china-map/)

China possesses favourable natural and geographical conditions for embracing naturalistic planting, given its vast territory, diverse ecological environments, and abundant species resources. Covering 9.6 million square kilometres (Figure 1.1), China features mountainous regions comprising about two-thirds of its total area, while the remaining one-third consists of plains, plateaus, and basins. The country's complex topography and diverse climates enable a wide range of crops, animals, and plants to thrive. China boasts the highest number of plant species globally (Jiang and Yuan, 2017), with its higher plant species accounting for approximately 8%-12% of the global total. Furthermore, China's rich biodiversity is marked by over 37,699 species, including 31,961 angiosperms, 289 gymnosperms, 2,340 ferns, and 3,109 bryophytes (Lin *et al.*, 2021). A remarkable more than 15,000 seed plant species are endemic to China, composing around 50% of the worldwide total.

In tandem with its natural attributes, China's cultural history has nurtured a profound connection with nature, forming an ideal backdrop for naturalistic planting. The pursuit of a harmonious relationship with the natural world has been a fundamental aspect of Chinese culture since prehistoric times (Zhang, 2016), culminating in the development of Chinese Shanshui culture (Yang, Hou and Cao, 2021). Rooted in the concept of 'Shanshui' (which refers to the natural scenery of 'mountains' and 'water'), embodies a multitude of meaning and

aesthetic concepts of ‘nature’, ‘scenery’, and ‘landscape’ (Wu, Wang and Zhao, 2019). Chinese Shanshui culture reflects the Chinese interpretation of natural forms, showcasing a deep appreciation and aesthetic sensibility towards natural elements since ancient times.

Despite the inherent advantages of naturalistic planting design and the supportive cultural and contextual foundation in China, the widespread adoption and public acceptance of this design approach remain limited. Additionally, there exists a paucity of authoritative published research concerning public perceptions and preferences towards designed naturalistic urban planting within the Chinese context.

In summary, the study of landscape perception and preference assumes paramount importance for advancing Chinese natural landscape design. Not only does it establish the theoretical groundwork for future urban landscape design endeavours, but it also illuminates the path for the potential development of urban ecological construction.

1.2. Research gaps

Upon a thorough review of the existing literature, a notable research gap emerges concerning attitudes towards designed naturalistic urban planting in China. The term ‘naturalistic planting’, and particularly its concept of ‘naturalistic’, remains ambiguously defined in Chinese published research, lacking precise definitions and detailed descriptions. Additionally, much of the existing research on the presentation of ‘natural’ landscapes relies on photograph-based visualizations rather than more comprehensive on-site surveys, potentially leading to less accurate results.

In response to these identified gaps, this study aims to comprehensively assess public perceptions of naturalistic planting by focusing on real-world sites featuring authentic designed naturalistic landscapes. This approach involves a systematic comparison of public reaction to these planting designs, Chinese conventional planting, and real natural environments situated beyond urban contexts, in various scenarios and at different scales. To achieve a robust understanding, the research methodology employs a combination of extensive questionnaires and in-depth interviews. Moreover, it aims to delve into the genuine attitudes of Chinese greenspace users towards nature within and outside of an urban context, uncovering intrinsic motivations that drive these attitudes. By doing so, it aims to shed light on the intrinsic motivations shaping the greenspace users’ perceptions and preferences for designed naturalistic planting in urban environments.

1.3. Research aim and questions

The research aims to assess public attitudes towards naturalistic planting design in China and explore changing perceptions and preferences for future urban greenspace design and management.

The specific objectives of the study are as follows:

- To comprehensively and systematically explore the perceptions of naturalistic planting, considering the broader contextual aspects of the perceptions of 'nature' and 'urban nature'.
- To conduct a comparative analysis between Chinese perceptions of naturalistic planting and the prevailing conventional planting approaches in various scenarios and scales, focusing on urban parks and show gardens.
- To identify the key characteristics that significantly influence the perceptions of Chinese greenspace users regarding designed planting in urban greenspaces.
- To investigate the impact of greenspace users' beliefs, values, and socio-demographic factors on their response to naturalistic planting.
- To examine the attitudes of decision-makers towards naturalistic planting design and formulate potential implementation strategies for naturalistic planting in the future.

To address the research gap and fulfil the stated research aim and objectives, the following research questions and sub-questions have been outlined (Figure 1.2):

Research Question 1: How do Chinese greenspace users recognise, define and perceive 'nature'?

- 1.1 What are current Chinese participant patterns of using nature?
- 1.2 What is the representation, definition and perception of 'nature' and 'natural vegetation' of Chinese greenspace users? What is the relationship between the 'human being' and 'nature'? What are concerns about nature?
- 1.3 How are greenspace users' attitudes towards nature related to Chinese culture?

Research Question 2: How do Chinese greenspace users recognise and evaluate 'urban greenspace'?

- 2.1 How do greenspace users define 'city' and what is the relationship between the 'city' and 'nature'?
- 2.2 What are the benefits and difficulties of establishing 'nature' in cities?

Research Question 3: How do greenspace users perceive naturalistic planting in urban areas?

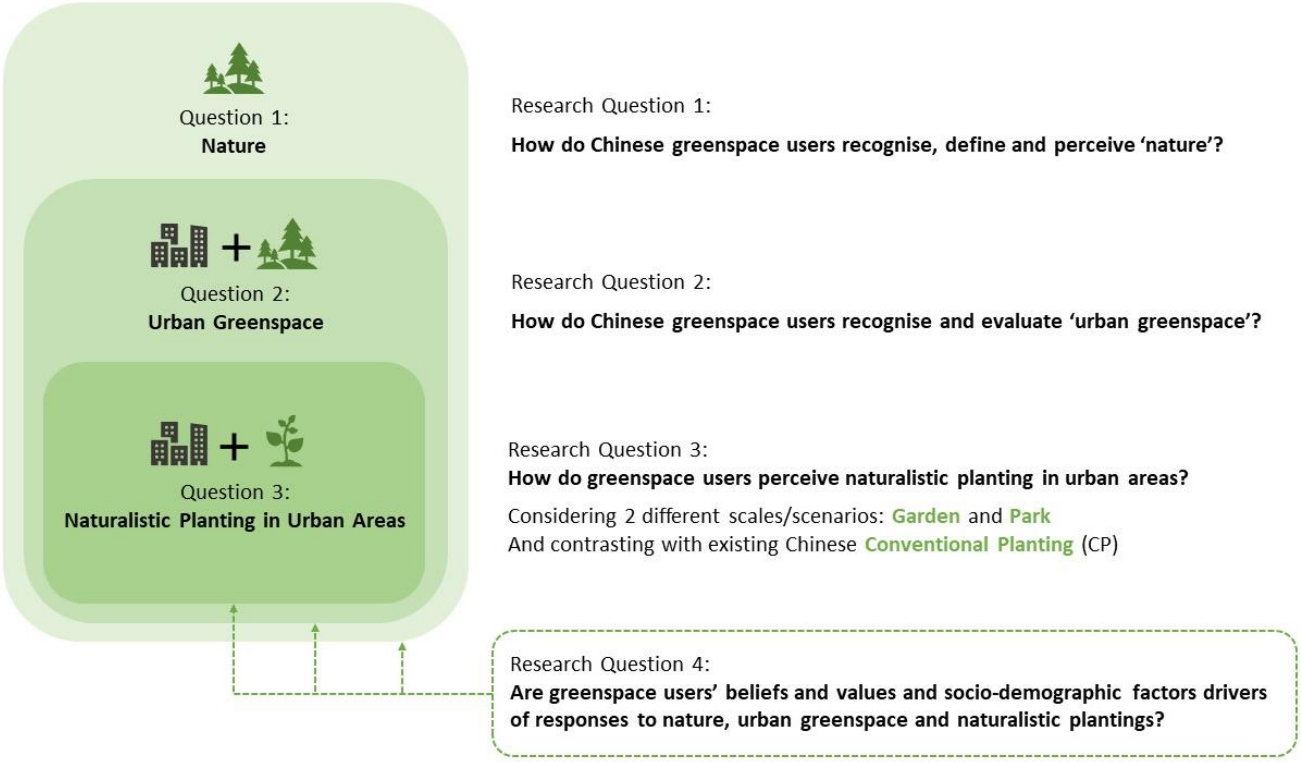
- 3.1 How do greenspace users perceive naturalistic planting (NP) and conventional ornamental planting (CP) in urban parks and show gardens respectively?

- 3.2 What planting characteristics are most valued by greenspace users about nature and naturalistic planting?

Research Question 4: Are greenspace users' beliefs and values and socio-demographic factors drivers of these responses?

- 4.1 How are greenspace users aware of environmental issues and are their beliefs and values in relation to environmental issues drivers of these responses?
- 4.2 Are greenspace users' socio-demographic factors drivers of these responses?

Figure 1.2 Research framework diagram and research questions



1.4. Thesis structure

Chapter 1: Introduction. This chapter outlines the scope, context, and importance of the research, along with its aims and research questions. It provides an overview of the content to be covered in the subsequent chapters.

Chapter 2: Literature Review. The literature review offers a background understanding of nature and urban nature, with a particular focus on the Chinese context. It provides an overview of the existing research that informs the current perception and preference for naturalistic planting in both Western and Chinese contexts. The chapter also discusses commonly employed research methodologies for investigating perception and preference for naturalistic planting.

Chapter 3: Methodology. This chapter details the site selection and survey methods used in the study. It clarifies the chosen site and describes the two survey methods employed, namely on-site questionnaires and on-site and online interviews.

Chapter 4: Results. It presents our findings in relation to Chinese greenspace users' definitions of nature, evaluations of urban greenspace, and perceptions and preferences for naturalistic planting. The data is presented and organized in alignment with the primary research questions, incorporating both quantitative and qualitative analysis.

Chapter 5: Discussion. The discussion chapter interprets the results based on the research questions. It starts with a broader background on the concept of 'nature', focusing specifically on 'wild nature'. The discussion then transitions to 'urban nature' and delves into the core question, exploring public attitudes towards 'naturalistic planting' in urban areas.

Chapter 6: Conclusions. In this chapter, the research draws upon the most significant results and findings presented in the previous chapters, providing overall conclusions and implications.

References and Appendices. References present all the sources cited in the thesis and appendices offer supplementary information to certain chapters, including English and Chinese versions of questionnaires, and outlines of interview questions.

| Chapter 2 : Literature Review

This chapter discusses the conceptual background by initially addressing the introduction and benefits of urban nature and naturalistic planting design in Western culture. It then delves into the Chinese context, exploring the historical background that has shaped the Chinese view of nature and how this may have influenced the attitude towards urban greenspaces in contemporary China. Additionally, the chapter provides an overview of the research that underpins the current perception and preference for naturalistic planting in both Western and Chinese contexts. Furthermore, the chapter outlines the commonly employed research methodology used to investigate the perception and preference for naturalistic planting. The chapter aims to establish a theoretical foundation for the subsequent research methodology design and make a valuable contribution to the wider discussion on the value and potential of naturalistic planting as an approach to sustainable landscape design in urban areas in China.

2.1. Urban nature and naturalistic landscape design

2.1.1. Introduction to nature and urban nature

Nature encompasses a wide range of definitions and explanations across various contexts. A broad but pragmatic definition of nature is *'areas containing elements of living systems that include plants and nonhuman animals across a range of scales and degrees of human management, from a small urban park through to relatively "pristine wilderness."'* (Bratman, Hamilton and Daily, 2012). Van den Born *et al.*(2001) define nature commonly perceived by lay people in three main categories: 'wild nature', encompassing fundamental natural phenomena and sceneries, such as rainforests and earthquakes; 'arcadian nature', characterized by the harmonious coexistence of humans and the natural environment on a small and intimate scale, such as willows in grasslands; and 'penetrative nature', which refers to the natural elements that infiltrate places designated for human use, such as garden weeds. These nature types are valued for their contributions to human health, intrinsic worth, and the well-being of future generations. Building upon visions of nature, De Groot and Van Den Born (2003) point out that respondents generally tend to prefer landscapes with 'greatness and forces of nature' and 'wild, interactive' landscapes, compared to park-like arcadian landscapes and landscapes made by and for people.

Urban nature, by contrast, is described as nature-at-the-doorstep, rather than extending to distant mountains, beaches, canyons, and primaeval forests (Kaplan, 1984). As urban populations continue to expand, people living in towns and cities are increasingly eager to connect with nature. Paradoxically, the majority of urban dwellers are in contact and experience with nature within the highly managed context of the built environment, which is often remote from the relatively pristine wilderness (Hoyle, 2020). The urban nature experience can be attained by implementing well-designed urban green infrastructure with a natural planting structure, which is perceived as biodiverse, visually appealing, and restorative (Hoyle, Jorgensen and Hitchmough, 2019).

Kaplan and Kaplan (1989) characterize urban nature as 'nearby nature', encompassing urban parks, street trees, backyards, and other similar settings. Expanding on the concept of 'nearby nature', Newman and Dale (2013) offer a more detailed perspective on urban nature as 'mundane nature', which encompasses three forms, including 'remnant nature' which refers to urban undevelopable spaces, buffer spaces, and intended remnants, such as riverbanks, railway lines, and un-manicured parks. Another form is 'cultivated nature', which involves industrial and agricultural applications for ecological service purposes, such as rooftop gardens and urban farms. The third form is 'nature as display', which includes highly mediated spaces designed for display purposes, such as formal parks and gardens.

One of the most common types of planting found in urban nature is mown grassland with monotonous structures, also known as amenity grassland or lawn, which is especially prevalent in temperate regions. It is frequently applied in residential front yards (USA) and gardens (UK), with only a small proportion of roughly 1.5% of front yards in Ontario city being classified as alternatives for traditional lawns (Henderson, Perkins and Nelischer, 1998). Mown grassland also dominates urban parks as recreational grounds (Kendle and Forbes, 1997). Similarly to Western countries, a well-manicured lawn holds significant importance in Chinese urban green space, as it has a universal symbolism as a sign of status and financial prosperity in Chinese culture (Yang *et al.*, 2019). Yang also indicates that lawns are not considered essential spaces for recreational activities by the Chinese public such as sitting, walking, picnicking, and sporting, which can be attributed to cultural factors limiting their accessibility, i.e., because of high population density and climatic factors and Chinese urban greenspace management policies. Instead of being recreational spaces in the USA and UK, it is recognized and preferred by Chinese park visitors for their aesthetic benefits i.e., neatness and green colour, which is in line with the perceived care in neatness landscape is a primary determinant of landscape attractiveness in Nassauer (1988)'s earlier work. However, the excessive pursuit of mown grassland can lead to high maintenance costs (Boorman, 2004), groundwater pollution associated with the deposition of chemical pesticides and fertilizers (Robbins and Birkenholtz, 2003), and less provision of ecosystem services as lower biodiversity (Smith, Chapman and Eggleton, 2006).

Formal ornamental designs are also commonly used in urban green spaces, where human intervention is apparent in shaping nature's patterns and forms for visual aesthetics. Formal plantings have been appreciated by park users since the 1870s when carpet-planting gained popularity in the UK (Nam and Dempsey, 2019). Formal ornamental plantings are characterized by artificial features, geometric or uniform patterns, a neat and tidy appearance, intensive maintenance, and obvious human control in the design and management (Özgüner, Kendle and Bisgrove, 2007). It embraces the notion of nurturing in the conventional concept of the horticultural garden (Rhode and Kendle, 1997). Whereas, the provision of formal ornamental planting declines due to its economic constraints, skill deficit and ecological benefits (Özgüner and Kendle, 2006).

Mown grassland and formal ornamental planting are frequently employed in the design tactics of urban green spaces in both Western and Chinese contexts due to their neat and tidy appearance, which effectively communicates 'cues to care' (Nassauer, 1988). In Nassauer's research perceived care often serves as a decisive factor in shaping the overall attractiveness of an urban landscape, with the visual neatness and cleanliness of the environment being prominent indicators of the level of care. Additionally, some exemplary features (Nassauer, 1988, 1993, 1995) also include:

> *'Mown turf, flowering plants and trees, visible and crisp edges of different patch types, bold patterns, foundation planting, trimmed shrubs, plants in rows, neatness and order (no litter, things are put away, no weeds), fences, architectural details, lawn ornaments, and structures painted and in good repair, wildlife feeders and houses, and signs that label environmental benefits or caretakers of the land.'*

Despite mown grassland and formal ornamental planting presenting a care aesthetic, early studies have shown that urban spaces with a wilder appearance, featuring woodland, multiple layers of vegetation, and unmown grass or herbaceous layers, were more highly valued by the public (Burgess, Harrison and Limb, 1988). A study in Warrington New Town, UK also suggests that residents generally favour manicured and well-maintained landscapes in the immediate vicinity of their homes, but also desire more natural and untamed green spaces close to their local communities (Jorgensen, Hitchmough and Dunnett, 2007). Thus, naturalistic planting, which incorporates ecological, aesthetic, and economic considerations, has gradually become more popular in urban nature (Hoyle *et al.*, 2017).

2.1.2. Introduction to naturalistic planting design

Nowadays, the naturalistic planting design is increasingly employed in urban areas, taking inspiration from wild nature, and applying ecological approaches to planting, often referred to as naturalism. A short explanation of naturalism given by Ogrin (1988) is that it is an imitation of nature, a mimesis of natural features, which is a

basic principle applied in landscape design. The use of the words 'natural', 'naturalistic' and 'ecological', on occasion, can be seen to be ambiguous. These words are used interchangeably to some degree, they do have a different meaning, but they all relate to nature (Kingsbury, 2004).

In the eighteenth century in the UK, the English landscape had a profound revolution caused by the English Landscape Movement, and people pursued horticultural exaggeration by using colourful planting (Forbes, Cooper and Kendle, 1997). Planting in a private garden can be abstractly interpreted as the exaggeration of nature, and also, as a latent desire for colour and drama in the human psyche (Dunnett and Hitchmough, 2004). Conceptions of nature were gradually expressed by abstracting the form from organic patterns and irregular spatial organisation. During this time, landscape design experienced the development stage of the 'picturesque' landscape style, which incorporated forms and arrangements evoking the sublime and untamed aspects of nature, while also integrating different landscape elements and 'gardenesque' planting by introducing non-native vegetation (Simonič, 2003; Ellison, 2014). With the nineteenth-century overseas trade development, plenty of exotic plants from different geographical regions were used in designs which contributed to the development of naturalistic landscapes and the evolution of garden styles, especially in the promotion of botanical garden design which aimed to exhibit plants in the most instructive way. In the last decades of the nineteenth century, many landscape architects took aesthetic value, cultural and ecological outcomes into synthesising consideration, and extensively established this nature-like planting in the Netherlands, Germany and North America (Dunnett and Hitchmough, 2004; Hitchmough, 2017b; Dunnett, 2019). Ecological planting gradually became a mainstream movement when naturalism was developed and promoted in the early twentieth century (Woudstra, 2004). Natural processes of ecological science gradually became the basis for naturalistic design. Lavorel *et al.*, (1997) highlight how the development of naturalistic design benefited from the rapid advance of mechanisation as it allowed large areas of land to be managed and maintained.

Nowadays, contemporary naturalism is gradually integrated with the advantage of impressionistic, modernistic and technocratic naturalism, which is widely applied to landscape planting design (Dunnett, 2019). Hitchmough (2004) points out that naturalistic planting should take the 'nativeness', habitat value, ecological fitness and community stability as well as aesthetic conceptions into consideration. His later research indicates that naturalistic planting refers to the use of plant species that imitate both naturally occurring plant communities and a carefully-designed assortment of plant species from various regions of the world (Hitchmough, 2017b). The vegetation in naturalistic planting displays visual patterns and rhythms similar to semi-natural vegetation, but it lacks an obvious structure except for the subtle repetition of individual species. Dunnett (2019) gives further description of naturalistic planting as 'high impact, low input planting' and provides design guidelines:

- *To create very dramatic and beautiful visual effects, with high public appeal.*
- *To give year-round visual interest.*

- *To be very colourful and uplifting.*
- *To have high wildlife and biodiversity value.*
- *To require low-resource inputs such as water, fertilizers, and time.*
- *To use simple, 'extensive' maintenance techniques, more similar to nature conservation than gardening - hay meadow cutting, coppicing.*

2.1.3. Benefits of urban nature and naturalistic planting

The benefits of urban nature and naturalistic planting can be categorized in terms of human, ecological and economic benefits. In terms of the benefits of urban nature for people, numerous studies have categorized the advantages of human-nature interaction into different types. Rohde and Kendle (1994) identify five primary categories of the positive impact of urban nature based upon emotional, cognitive, developmental, behavioural, and social values. Hartig *et al.* (2014) outline four key pathways linking nature and health, which involve air quality, physical activity, social cohesion, and stress reduction. Soga and Gaston (2016) summarize benefits according to categories such as 'health and well- being', 'emotional changes', 'attitudinal changes', and 'behavioural changes'. Marselle *et al.* (2021) identify four pathways that establish a connection between biodiversity and human health, encompassing the beneficial pathways of 'reducing harm'(e.g., providing medicines and food), 'restoring capacities' (e.g., reducing stress) and 'building capacities' (e.g., promoting physical activity and different experience), as well as the harmful pathway of 'causing harm' (e.g., causing diseases and allergens). These different categorizations collectively contribute to a comprehensive understanding of the impacts of human-nature interaction on individuals, particularly regarding the various benefits involved.

Multiple studies have contributed to the understanding of the characteristics of natural settings that trigger benefits for humans, ecology and the economy and the underlying mechanisms behind them. (Berman, Jonides and Kaplan, 2008; Keniger *et al.*, 2013; Soga and Gaston, 2016; Bratman *et al.*, 2019; Choe, Jorgensen and Sheffield, 2020; Marselle *et al.*, 2021). Based on the typology of benefits identified in the research conducted by Keniger *et al.* (2013), Table 2.1 presents a compilation of examples from the original study (Keniger *et al.*, 2013), as well as additional findings on post-2013 benefits that have been summarized by the author.

Table 2.1 Typology and examples of benefits of interacting with nature in research: Keniger et al. (2013) findings and subsequent findings. (Middle column: examples derived from research; right column: examples published post 2013 and summarized by author)

Category	Examples (Keniger et al., 2013)	Examples and reference (post-2013)
Psychological well-being	Increased self-esteem Improved mood Reduced anger/frustration Psychological well-being Reduced anxiety Improved behaviour…	Alleviated 'biophobia' and fear of and aversion to nature. (Zhang, Goodale and Chen, 2014) Reduced burnout, depression and anxiety. (Sahlin *et al.*, 2015) Increased subjective wellbeing. (White *et al.*, 2017) Provided 'wow factors' and restorative effect (Hoyle, Hitchmough and Jorgensen, 2017a) Regulating health explained by environment–microbiome–health axis.(Robinson and Jorgensen, 2020)
Cognitive	Attentional restoration Reduced mental fatigue Improved academic performance Improved productivity…	Restored the ability to direct attention. (Kaplan and Berman, 2013) Enhanced cognitive tasks and motivated work.(Joye, Lange and Fischer, 2022)
Physiological	Stress reduction Reduced blood pressure Reduced headaches Reduced cardiovascular, respiratory disease and long-term illness…	Increased self-reported physical activity and neighbourhood satisfaction. (Albin *et al.*, 2008; Jong, Albin and Sk, 2012) Restored physiological health, especially in the forest interior. (Chiang, Li and Jane, 2017)
Social and Spiritual	Facilitated social interaction Reduced crime rates Enables interracial interaction Increased spiritual well-being…	Increased social interaction and promoted social inclusion among vulnerable and isolated groups.(Sempik, Rickhuss and Beeston, 2014)
Tangible (Including ecological and economic benefits)	Food supply Money	Reduced air temperature through shading and evapotranspiration. (Zardo *et al.*, 2017) Improved urban climate and thermal comfort. (Fung and Jim, 2019) Reduced energy demand and cost for cooling. (Quaranta, Dorati and Pistocchi, 2021) Increased heat mitigation, biodiversity and greenness and reduced runoff. (Cortinovis *et al.*, 2022) Improved air quality and promoting pollutant deposition and retention. (Lindén *et al.*, 2023)

It can be argued that introducing 'high impact, low input' naturalistic planting has human, ecological and economic benefits over and above that of other forms of urban nature (Dunnett, 2019). Principally because naturalistic planting mimics the diversity and complexity of natural ecosystems in urban landscapes and it aims to promote ecological sustainability and improve the well-being of urban residents. Walking through areas with naturalistic planting has been associated with self-reporting higher levels of psychological restoration compared to environments with less naturalistic structures (Hoyle, Hitchmough and Jorgensen, 2017a, 2017b). Naturalistic plantings also facilitate post-surgery recovery, enhance attentional focus, and aid in recovery from

emotional states (Choudhry *et al.*, 2015). Moreover, naturalistic plantings have social benefits. For instance, it was considered that provide more tranquillity and shelter in the city, compared to Victorian formal planting (Boyd, 2020).

In terms of ecological aspects, naturalistic plantings embrace a wild aesthetic that enables the vegetation to fully flourish, or as some may describe it, 'become overgrown' (Berg and Winsum-Westra, 2010). It exhibits greater stability and long-term success in succession, boasts a wider diversity of organisms, and has longer visual displays due to its more dynamic plant communities compared to the ornamental plantings (Dunnett, 2004; Heatherington, 2015). To be specific, selecting plants for naturalistic planting design based on their natural habitats or environmental conditions results in similar adaptations and creates a cohesive visual appearance in a planting (Dunnett, 2019). Furthermore, the use of designed naturalistic plant communities consisting of temperate and near-Mediterranean plant species is being considered as a potential sustainable approach to mitigate future climate changes in the UK (Alizadeh and Hitchmough, 2020). Naturalistic vegetation can attract wildlife throughout the year, offering wildflowers as a potential food source for invertebrates, birds, and small mammals in both summer and winter (Hitchmough and Woudstra, 1999; Taylor, 2017). In addition, selecting robust, long-lived plants that can survive heavy annual mulching, resist slug damage, and grow without additional nutrients and water, eliminates the need for division or staking (Hitchmough, 2004a).

Naturalistic planting can also have significant economic benefits. Studies have shown that implementing naturalistic meadow-like planting can be a cost-effective approach in terms of both establishment and long-term management (Hitchmough, De La Fleur and Findlay, 2004; Hitchmough and Fleur, 2006). While establishing naturalistic planting may not be as economical as amenity mown grass (Hacker, 2004), managing mown grass is significantly more expensive due to the need for frequent cutting and disposal of the clippings, as noted by Boorman (2004) and Hoyle *et al.* (2017). Therefore, perennial meadows in naturalistic planting could potentially serve as a viable and more cost-effective alternative.

To sum up, the incorporation of naturalistic planting into urban landscapes can be an effective strategy for enhancing the benefits of urban nature and promoting the creation of healthy, sustainable cities.

2.2. Nature in Chinese culture

Nature has played an important role in shaping Chinese culture and has been integral to Chinese philosophy and literature for centuries. Its representation and interpretation have changed over time, with 1840 marking the dividing point between ancient and modern China (Chen, 2017). Before 1840, China was a prosperous and powerful empire with a rich cultural heritage and a long history of civilization. However, a series of foreign invasions, territorial losses, political and social upheavals, the collapse of the imperial dynasty of China, the rise of warlords, and civil unrest led to the establishment of the People's Republic of China in 1949. While, Keswick (1978) argues that at least until the middle of the eighteenth century, Chinese people were considered to have had a greater impact on the environment and received more from nature than any other people on earth. Thus, this section will discuss the Chinese view on nature throughout history, roughly divided into two parts: ancient China (before 1840) and modern China (after 1840).

2.2.1. Nature in ancient China (before 1840)

The Chinese view on nature began in prehistoric society (around three million years to 2000 B.C.), and gradually formed a complete system of agriculture, manufacture, tribe association and spiritual culture in the process of the humanization of nature (Zhang, 2016). Zhang's research has shown that the view of nature was deeply intertwined with the prehistoric understanding of 'dead and alive', cosmology, and totem worship within the religious system. Sun (2013) shows that totem worship among Chinese ancestors reflects their deep reverence for the power of nature. Through this form of worship, they sought to honour not only individual natural objects but also deities that transcended the natural world. According to Keswick (1978), the ancient Chinese were able to harmoniously adjust to nature and fully realize its abundant potential, which is reflected in their creation of idealized myths. Meanwhile, they regarded the alteration of the environment as an adornment rather than subjugation. Ren (2004) points out that the worship and myths among Chinese ancestors were primitive and imaginative, yet the initial bond between humanity and nature nurtured the development of religion, philosophy, and nature art in later generations, and served as a foundation for modern civilization.

The term 'nature' is also known as 'Shanshui' in Chinese culture, signifying 'mountains and waters' and frequently employed in artistic creations that draw inspiration from and are composed of elements derived from nature. Nowadays, numerous studies have demonstrated the close relationship between the ancient view on nature and the development of Shanshui garden design (Keswick, 1978; Chen, 2009; Liu, 2013), religion and philosophy (Li, 2009; Zhou, 2014; Ran, 2020), and other artistic forms related to Shanshui culture, i.e. literature, calligraphy, painting (Zhang, 2006; Huang, 2020; Wang, 2021; Xu, 2021).

i) Nature in Chinese traditional garden design

Much research on the Chinese perspective of nature has been conducted by studying traditional garden design, as it is an artistic product that reflects the changing views on nature (Keswick, 1978; Han, 2006, 2012). Imperial gardens, private gardens, and temple gardens constitute the three primary types of Chinese traditional gardens throughout history (Zhou, 2008; Pan, 2011). During the feudal society of China (B.C.475-1840), political power was centralized on the emperor. The Imperial Garden, serving as the exclusive retreat for emperors, reflected the splendour of dynasties and political power through its large quantity, massive scale, and royal luxury (Keswick, 1978; Chen, 2016; Yang, 2019). Unlike Imperial gardens, which exhibited limitless luxury and exquisite craftsmanship, the scale and standards of private gardens were restricted by feudal proprieties since they were owned by noble families, scholar-bureaucrats, and the rich (Liu, 2013). Chambers (2016) provides another explanation that the Chinese were not fond of walking, they laid out a variety of scenes within small-scale grounds which can be seen at a glance. As Buddhism and Taoism thrived, temple gardens emerged as courtyards in the temple or affiliated gardens surrounding the temple (Pan, 2011). Temple gardens did not pursue a strong religious expression, on the contrary, they emphasized a relaxed, quiet and comfortable atmosphere, so temple gardens were typically located in remote areas and attracted many literati and scholars for self-cultivation (Zhou, 2008; Zhang, 2010).

The rudiment of Chinese classical gardens can be traced back to the Shang Dynasty, which dates back to around the sixteenth century B.C. This is evidenced by written records at the earliest, that is 'You(囿)' and 'Tai (台)' structures: the term 'You' refers to an animal farm used for imperial hunts and pleasure, featuring rare animals; Meanwhile, 'Tai' refers to a mesa or terrace on a mountain that was used for observing the sky and stars for divination and worship purposes (Zhou, 2008). With the increasing popularity of gardens, advancements in plant cultivation technology, and a greater diversity of cultivated species, ordinary people began to recognize the beauty of plants and appreciated their symbolic meanings. This appreciation was documented in ancient collections i.e., *The Book of Songs* and *The Analects of Confucius* (Keswick, 1978; Zhou, 2008). From that point on, the Shanshui culture and the Shanshui aesthetic concept began to emerge, and ordinary people's attitudes towards nature were no longer just based on feudal worship but also on enjoyment.

During the Wei-Jin and Northern-Southern Dynasties (220-581), the development of various schools of thought, such as Confucianism, Taoism, and Buddhism, had a significant impact on the arts, particularly garden design (Zong, 2013). The pursuit of garden size was replaced by a focus on artfully mimicking nature, and gardening techniques were combined with elements of reality and romanticism to generate a sense of detachment and distance, all while serving as a means to fulfil both material comforts and spiritual enjoyment (Xue, 2005; Zhou, 2008; Chen, 2009; Guan, 2016). During the Sui and Tang Dynasties (581-907), there were significant

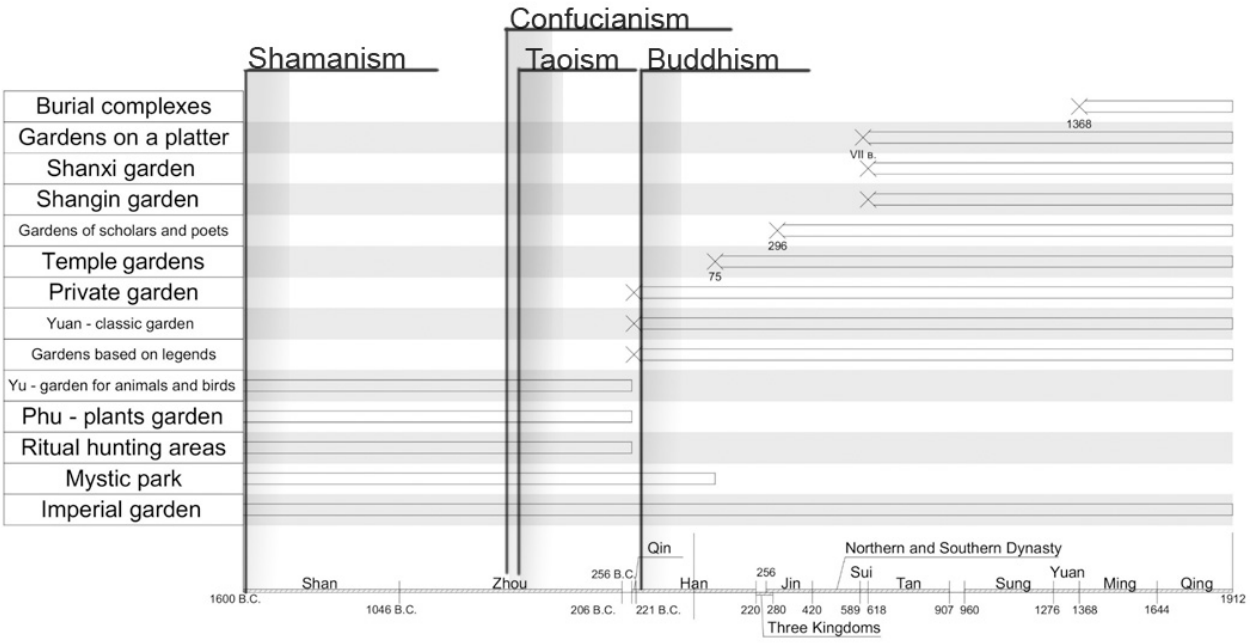
improvements in garden design concepts and skills, with the use of rocks to depict mountains and winding water featuring prominently (Han, 2006; Zhou, 2008).

In the Song Dynasty (960-1279), the elements of piled-up rocks, water, building structures, and ornamental plants were upgraded and became more diverse (Wang, 2013). The garden design of this period perfectly combined 'realistic' form with 'impressionistic' harmony, resulting in picturesque and poetic expression (Xue, 2006). During the Ming and Early Qing Dynasties (1368-1911), public gardens emerged in both cities and the central countryside. Diverging from private gardens primarily catering to the affluent and educated class, these public gardens served the purpose of accommodating ordinary individuals and facilitating multifunctional greening initiatives. Due to an excessive focus on formal beauty and design techniques, and the transformation of gardens from a place for relaxing and enjoying the scenery to a functional-led area, combining commerce and the service industry (Zhou, 2008).

ii) Religious and philosophical views of nature

Tceluiko (2019) explored the impact of prevalent religions such as Shamanism, Taoism, Buddhism, and Confucianism on Chinese landscape art. This research also provided a timeline illustrating how different types of Chinese gardens emerged in conjunction with the development of these religions (Figure 2.1).

Figure 2.1 The chronological analysis of the types of Chinese gardens in Tceluiko's research (2019).



However, Shamanism declined after Neo-Confucianism became the dominant ideology, as it was viewed as uneducated and chaotic (Yang, 2015). Thus, Confucianism, Taoism, and Buddhism are considered the

mainstream of traditional Chinese philosophy that profoundly influence Shanshui Culture, views of nature, and practical garden designs (Li and Wang, 2008; Zhou, 2008; Li, 2009; Chen, 2016).

Confucianism, established by Confucius in the fifth century B.C., emerged as the dominant ideology during China's feudal era (Ren, 2019). Inspired by Confucianism's philosophy of 'comparing men's virtues with natural scenery (君子比德)', well-educated people began to respect the natural landscape and pay more attention to mountains-buildings and water-managing in classical garden design, which determined the development direction of Chinese garden design (Zhang and Wang, 2016). At the same time, the Confucian thoughts of 'the golden mean (中庸之道)' and 'harmony is precious (和为贵)' had a more direct impact on the creative form of garden design; Confucianism maintains an impartial balance among the design elements and presents a harmonious scene in Chinese gardens (Wang, 2016).

Taoism, also known as Daoism, was founded by Lao Zi and gradually became a native religion in the late Eastern Han Dynasty (25-220 A.D.). Taoism takes the natural view of heaven and earth as its main theme and advocates the political rule of 'govern by doing nothing that goes against nature (无为而治)', a concept that still holds significance and deeply influences contemporary Chinese landscape design. Taoism's laissez-faire attitude toward the way to achieving an ideal personality is in opposition to Confucianism which emphasises the importance of self-cultivation (Zhou, 2014; Ran, 2020). Taoism advocates 'The great beauty of heaven and earth is silence (天地有大美而不言)' and 'recovering people's original simplicity (返璞归真)' and develops the aesthetic thought with natural beauty and encourages scholars to pursue a quiet life with indifference to and detachment from fame and fortune. Consequently, under the influence of Taoist thought, a romantic garden design style featuring the elegance of flowing water located commonly at the foot of the mountain has prevailed, as an echo of the ancient ideas about the World Mountain and the World Ocean, which in China has become a steady symbol of the universe (Tceluiko, 2019). Taoism also attaches great importance to the eternity of life and achieves immortality; therefore, the imitation of the realm of immortals was emphasized in the large-scale garden landscape operated by the emperor (Pan, 2011).

Buddhism differs from Confucianism and Taoism, originated in ancient India, was introduced into China in the first century A.D. and gradually merged into the mainstream Chinese culture. Buddhism advocates cutting off all troubles before death and relieving the suffering of reincarnation after death giving an outlook on the next life and neglecting the pain in this life. Among these sects, Zen (Ch'an) has the most significant influence on Chinese philosophical thoughts (Hu, 1953). Zen attaches great importance to people's understanding as a way of thinking and entirely relies on intuition to experience the world without objective rationality (Hu, 1953). Zen has a significant influence on the Chinese classical gardens, especially in the conception of 'being moved by what one sees (触景生情)', which is the relationship between artistic conception and physical environment (Wang, 2004).

Incorporating the aforementioned three traditional ideologies, Confucianism, Taoism, and Buddhism, the overarching perspective on nature gradually evolved and laid the foundation for three core principles in Chinese garden design, that is 'Harmony between man and nature (天人合一)', 'Aspiration for intimacy with nature (寄情山水)', and 'A secluded life away from worldly concerns (崇尚隐逸)' (Zhou, 2008). 'Harmony between man and nature' was initially generated in the Zhou Dynasty (1046 B.C.-771 B.C.) and put forward and clarified by Confucianists in the Song Dynasty (960 – 1279), including three meanings: man and universe have initially been one; human life cannot disobey the laws of nature, and there is an interaction between man and universe. The Chinese methodology of Fengshui, which nurtures both the spirit and fertility based on the relationship between water, wind, and qi, was established through the concept of 'interaction' in its third meaning (Paton, 2021).

Overall, 'Harmony between man and nature' advocates the integration of natural scenery and man-made landscape in garden design that is 'created by human hand, but seems as if created by nature (虽由人作，宛自天开)'. 'Aspiration for intimacy with nature initially' was the collective unconscious of loving nature within the literati, which later evolved into a practice of travel and sightseeing, eventually gaining prominence as a prevailing social trend. 'A secluded life away from worldly concerns' was believed by hermits who could not achieve their aspirations or pursue individuality and free spirit. They usually avoided real life and had a secluded existence in the mountains for a long time. This thought has promoted the development of remote country gardens to a certain extent (Zhang, 2016).

iii) Nature in Chinese literature, calligraphy and painting

In Chinese ancient culture, the natural landscape is regarded as the primary subject of observation and a foundational source of inspiration for diverse artistic creations, encompassing literature, calligraphy, and painting, which continues to deeply impact contemporary Chinese appreciation of nature. A considerable body of literature on ancient Naturalism underscores the profound interplay between nature appreciation, literature, calligraphy, and painting, offering diverse perspectives that contribute to our understanding of the modern Chinese outlook on nature (Keswick, 1978; Liu, 1998; Cai, 2019; Chen, 2019; Huang, 2020).

Chinese Shanshui literature encompasses various literary forms, including poetry, essays, and novels, as well as steles, plaques, and stones in traditional gardens (Zhou, 2008). Tang poetry is a vital representative of Shanshui literature, conveying the connotation of a view of nature, and directly exhibiting its beauty through powerful descriptions of majestic scenery or exquisite expression in a small scene (Li, 2011). Moreover, Tang poetry lyrically expresses the author's sentiment, personality, and thoughts, making it a rich and multifaceted art form that reflects the depth and complexity of Shanshui culture (Liu, 2005; Xu, 2009; Duan, 2013). According to Xu

(2021), pastoral poetry, as a primary category of Shanshui literature, gradually began to use day-to-day scenery to describe the aesthetic appreciation of nature, rather than rare scenery away from human settlements, which contributed to the spread of Shanshui culture in society. Shanshui culture has been integrated into many classical novels, such as A Dream of Red Mansions, where detailed descriptions of the garden in terms of the rich plants, architecture, water bodies, rocks, and terrain vividly reflect the combination of Shanshui concepts and characters' daily lives (Quan, 2021).

Shanshui literature can also be found in traditional Chinese gardens on texts of couplets, inscribed boards, steles, plaques, and stones, often written by a calligrapher (Zhou, 2008) as Figure 2.2 shows below. In addition to the content expressed in texts, the shape of texts reflects the beauty of nature. Fan (2019) indicates that Chinese characters are static, while calligraphy with a dynamic and artistic nature is a way of refining vibrant ink lines by abstracting and rhyming the natural images.

Figure 2.2 Example of Shanshui literature in form of couplet(a), inscribed board(b), stele(c), plaque(d) and stone(e)

(a) 

(b) 

(c) 

(d) 

(e) 

Another vital aspect of Shanshui Culture is landscape painting. Zhang (2006) identifies that landscape painting encompasses a wide range of topics depicting nature, including mountains, water, vegetation, and various

times of the day. As a point of view and a simple embellishment, humans account for a small proportion of the entire picture, and the shape's outline is also simple. The small and simple figures within these artistic depictions can contrast the depth, remoteness and vastness of nature. Through this contrast, these figures express the ancient people's stance of humility and awe in relation to nature, conveying an awareness of humanity's limited and diminutive existence within the broader framework of the natural world.

Meanwhile, the prominent figures depicted in these scenes are often hermits, monks, scholars, farmers, fishermen, and travellers on donkeys. These figures, closely connected to nature, are portrayed as relishing the serene and rustic life amidst the natural surroundings. This suggests that people in ancient Chinese agrarian societies held a disposition of closeness to nature and aspired for a way of life untethered by worldly affairs (Zhang, 2006). In addition to human figures, structures as human traces are also a key element in the Shanshui painting; these mainly are houses, pavilions, temples, roads and bridges. These moderate transformations and utilization of the natural environment present human beings' and nature's harmonious relationship.

With the deepening of the understanding of natural aesthetics and the improvement of painting expression techniques, Shanshui painting was developed by leaps and bounds in the Tang Dynasty (618 – 907), and it reached maturity in the Song Dynasty (960 – 1279). Bian (2014) indicates that painters in the Song Dynasty used two-dimensional and three-dimensional observation and expression to highlight the depth between individual objects and the whole space, essential features of landscape paintings. In terms of expression, through the amendments and developments in object shaping, space creation and drawing techniques, the painters achieve similarity to the object itself, which can arouse the viewer's visual feeling and visual memory of nature.

2.2.2. Nature in modern and contemporary China (after 1840)

The view of nature in modern and contemporary China can be observed by tracing the trajectory of modern urban greenspace construction and development, which has experienced periods of advancement as well as setbacks. After the Anglo-Chinese War (1840-1842), China was forced to open its doors to foreign trade, which led to the prevalence of greenspaces in colonial areas of Chinese cities reflecting foreign national styles of outwardly sociable public space, in contrast to the traditional concept of gardens design that was characterised by an inward-oriented and occasionally reclusive nature (Zhao, 2008). Some Western modern concept of greenspace was eventually accepted during the Republican era, inspiring subsequent park development in China. Zhao (2008) also indicates that before 1949, the year of the founding of the new China, most people experienced poverty and famine, leading to a decrease in people's attention to natural aesthetics and the stagnant development of urban greenspaces. According to Li (1987), entire China had only 112 public parks spanning 2,961 hectares at that time. During the period from 1950 to 1966, the number of urban greenspaces

increased, and greenspaces designs were influenced by the Soviet Union to a certain degree (Xie, 2016). However, Xie also points out that the development was stagnant from 1966 to 1977 due to civil unrest during the Cultural Revolution. After the country's reform and opening up in 1978, the urban park system saw a rapid redevelopment in terms of both quantity and quality (Zhao, 2008; Li, Tong and Li, 2020; He and Zhao, 2022). The modern and contemporary history of China reflects that over time, the longing for nature among ordinary people has diminished or even plateaued. During this period, urban greenspaces, after fulfilling basic functions and requirements, did not prioritize natural aesthetics and ecological functions, resulting in a delay in landscape development during that era.

Nowadays, the view of nature has not significantly changed over time, but the Chinese natural environment is being affected by globalization and various challenges such as population increase, the rise of the middle class, urbanization, loss of arable land, and climate change (Shapiro, 2016). In 2020, President Xi Jinping announced China's goal of peaking CO_2 emissions before 2030 and achieving carbon neutrality by 2060, which requires the Chinese government to seek long-term strategies for ecological civilization to reduce the impact of climate change, promoted with the slogan 'Clear waters and green mountains'. The concept of nature-based solutions is increasingly being promoted in China since 2019. Despite Qi and Dauvergne (2022) arguing that this approach is a means to promote the national image and increase discursive power, this research acknowledges the accomplishments that have been made in the field of nature-based solutions over the past 40 years in China.

Overall, both Chinese traditional garden design and contemporary naturalistic planting share a core objective of conveying the harmony and sustainability of nature. According to Wang (2013), traditional Chinese gardens strive to replicate and depict nature through irregular and asymmetrical layouts, often resembling scenes from traditional Shanshui paintings. Conversely, Western gardens historically prioritize artificial beauty, showcasing the gardener's mastery of control and order, as evident in practices like ornamental horticulture in Victorian parks (Kendle and Forbes, 1997). The evolution of Western landscapes has been driven by rapid scientific and technological advancements, prompting an increased focus on the ecological advantages and spiritual fulfilment offered by urban nature. However, Chinese traditional nature philosophy doesn't inherently offer direct solutions to modern environmental challenges (Tai, 2006; Wang, 2013).

In the past century, China has undergone a series of both internal conflicts and external aggressions, coupled with natural disasters, resulting in a decline in the nation's economy and living standards. In response to these challenges, subsequent urban greenspace development in China has shifted its focus toward modern infrastructure, characterized by more organized and unified aesthetics, and simplified and effective planting techniques. This approach contrasts with the diverse and nature-mimicking style of traditional Chinese gardens. Following Maslow's Hierarchy of Needs theory, many individuals in contemporary China have met their basic

requirements and have turned their attention toward seeking spiritual connections with nature, particularly in accessible urban settings. Consequently, recent years have witnessed a growing interest in integrating natural elements into urban greenspaces using sustainable and cost-effective methods, aiming to create aesthetically appealing landscapes.

2.3. Perceptions of and preferences for naturalistic landscapes in urban areas

Over the past few decades, an expanding body of research has illuminated the profound influence of landscapes on human well-being and living environments. Early studies like the prospect and refuge theory (Appleton, 1975) reveal that humans naturally prefer landscapes offering both movement and concealment, allowing observation without being observed – a feature that once provided crucial resources and shelter for survival. Appleton further notes that aesthetic pleasure arises from environments that satisfy our biological needs; an ideal landscape presents clear features and secure opportunities for observing and exploring surroundings. Extending this exploration, Kaplan and Kaplan (1989) conducted 'psycho-evolutionary' research by delving into cognitive processes and introducing the 'Preference Matrix', which considers the factors underlying people's preferences for specific environmental attributes, taking cultural and personal factors into account. In today's context, technological advancements and refined analytical techniques enable more intricate investigations into the shaping of perceptions and preferences. Therefore, this section encompasses the definition of landscape perception and preference, an exploration of the aesthetic characteristics of naturalistic planting, an examination of culture backgrounds and sociodemographic factors, as well as contemporary Chinese research on landscape perception that highlights and readdresses our research gaps.

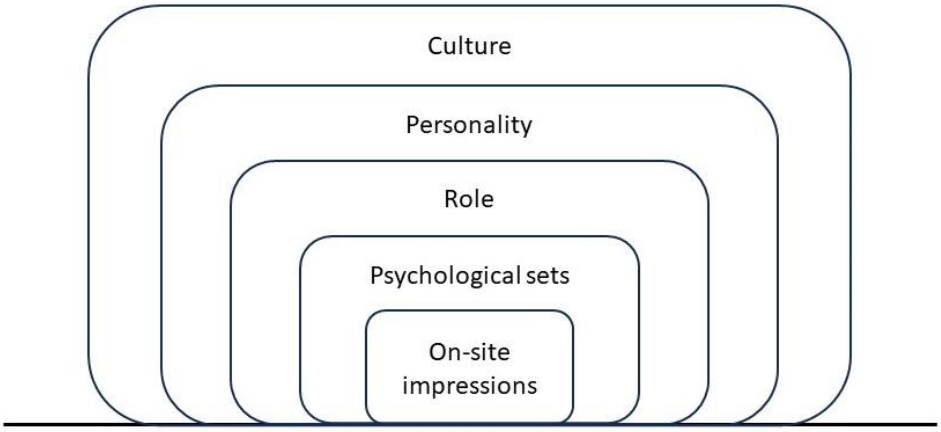
2.3.1. Definition of landscape perception and preference

In landscape research, the terms 'perception' and 'preference' pertain to two essential aspects concerning how individuals interpret and assess landscapes. Several comprehensive studies have highlighted the intricacy and complexity of research on landscape perception and preference, which can significantly vary due to differing explanations, including 'innate and biological responses' and 'cultural backgrounds and personal factors' (Kaplan and Kaplan, 1989; Jorgensen, 2004).

Landscape perception refers to how individuals comprehend and become conscious of their surroundings through their senses, encompassing sight, sound, touch, smell, and taste (Bell, 1999). Bell further elucidates that aesthetic perception involves the successive apprehension of distinct objects and the way individuals

perceive the overall scene's pattern as a cohesive whole. Everyday perception is a dynamic and interactive process influenced by various psychological and cognitive factors (Craik, 1983, 1986) (Figure 2.3). This process entails an individual's on-site impressions and psychological predispositions shaped by previous experiences, beliefs, emotions, and expectations. The observer's role in the environment, personality traits, and cultural influences also impact the perception process. Landscape perception is inseparable from personal experiences and landscape utilization, encompassing the processes of using, remembering, and learning (Penning-Rowsell, 1986).

Figure 2.3 Influences in the perception process, the model used in Craik's research (1983,1986).



Preference denotes an individual's inclination or fondness for specific features, attributes, or qualities of a landscape. Similar to landscape perception, Penning-Rowsell (1986) underscores that preferences and biases towards natural landscapes stem from a combination of factors, including an individual's biological traits, social systems, and personal characteristics, which can vary markedly among individuals. Moreover, Kaplan and Kaplan (1989) introduce a 'Preference Matrix' framework that outlines four primary factors contributing to landscape preferences in natural environments: coherence, complexity, legibility, and mystery. Building upon this framework, Bell (1999) identifies various landscape qualities that influence the perception, comprehension, and response to the landscape pattern, as illustrated below (Table 2.2). Additionally, Bell (1999) describes aesthetics as the amalgamation of perception and knowledge, and environmental aesthetics as not solely the successive perception of separate objects, but also the way individuals perceive the overall scene's pattern as a harmonious and unified entity.

Table 2.2 Each feature and its interpretation for two research on preference

Preference Matrix (Kaplan and Kaplan, 1989)		Qualities (Bell, 1999)	
Feature	Interpretation	Feature	Interpretation
Coherence	The ability to see and comprehend the pattern inherent in a scene.	**Diversity / complexity**	The complexity is expressed as layered, multi-scaled elements contrasting with one another.
Complexity	The range of different elements in an object or scene provides sensory stimulation.	**Coherence**	An ordered structure that we can understand.
Legibility	A well-structured space with distinctive elements and these are easy to understand and remember.	**Spirit of place**	A special quality of uniqueness that is identifiable.
Mystery	The aspects of a scene that cannot be comprehended all at once	**Mystery**	When the landscape has coherence, it cannot all be perceived at once.
		Multiple scales	A hierarchy or range of scales to the landscape pattern in relation to the human size.
		Strength	The overall mixing of the above five factors reinforces each other and enhances their individual qualities.

Overall, perception furnishes a foundation for comprehending how people interpret and react to the visual and sensory attributes of a landscape, while preference aids in better comprehending how individuals assess and prioritize diverse facets of a landscape. Both perception and preference play a pivotal role in understanding how individuals experience and value landscapes. In the next section, we will delve into the specific applications of perception and preference in landscape research.

2.3.2. Aesthetic characteristics of naturalistic planting

Naturalistic planting sets itself apart from Chinese conventional ornamental planting as it mimics the pattern of nature. Despite its numerous potential benefits, naturalistic planting has not been fully embraced by all urban residents. Early research reveals that people prefer to see 'natural scenes' in the rural context, but it is not appropriate to create wild 'nature scenes' verbatim in the urban landscape (Dunnett and Hitchmough, 2004). Some individuals appreciate the natural landscape as being spiritually good; however, it also is seen as a symbol of 'anti-civilisation', invoking fear and anxiety (Rhode and Kendle, 1997). Nowadays, many studies highlight the growing acceptance of biodiversity-friendly and species-rich natural planting in urban greenspaces, positioning it as a restorative landscape (Hoyle, Hitchmough and Jorgensen, 2017b, 2017a; Fischer *et al.*, 2018, 2020).

In contrast to the 'wildscape' in nature, man-made landscapes convey a sense of 'care' owing to their designed intention and tidy appearance (Nassauer, 1995b; Li and Nassauer, 2020). As the ecological benefits of naturalistic planting become more evident and designs cater to public aesthetic preferences while being consistently maintained, the acceptance of naturalistic planting is gradually increasing among urban dwellers, reducing the feeling of wildness and carelessness to some extent (Colley and Craig, 2019). Consequently, a

blend of functional and aesthetic elements is being applied to enhance the appearance of naturalistic landscapes in urban areas, also evoking a sense of 'care'.

Evidence demonstrates that vegetation's structure significantly influences perceived naturalness (Hoyle, Jorgensen and Hitchmough, 2019). Early research indicated that participants could discern changes in vegetation structure, yet their discrimination ability decreased as vegetation height increased (Lamb and Purcell, 1990). This research also indicates that tall and dense vegetation was perceived as more natural compared to low and open vegetation. However, some greenspace users, particularly women, find woodlands frightening, likely due to the multi-layered and dense vegetation (Jorgensen, Hitchmough and Calvert, 2002; Jorgensen, Hitchmough and Dunnett, 2007; Hashim *et al.*, 2016). Jansson *et al.* (2013) suggest that open-character vegetation with low-density undergrowth may enhance perceived personal safety without sacrificing health and social benefits. Additionally, features like mystery, which evoke a sense of danger, can also be highly appealing in specific scenarios, such as landscapes around fortifications (Pardela *et al.*, 2022).

In addition, the physical-visual properties of individual plants can influence people's visual preference for different types of vegetation (Misgav, 2000). Misgav's research identifies plant height, foliage colour and plant density are the most important factors in landscape construction, as rated by the public.

Concerning plant height, in the survey conducted by Todorova, Asakawa and Aikoh, (2004), the Althea rosea species with chaotic compositions and a tall flower was not favoured by participants and received a low evaluation of the survey. One possible explanation for this lower rating in the survey is that it may reduce the drivers' visibility.

Colour, especially floral colour, significantly influences perception and is widely applied in naturalistic planting design (Hoyle, Hitchmough and Jorgensen, 2017a; Hoyle *et al.*, 2018). While the flowering impact of naturalistic planting enhances the scene's visual appeal, the incorporation of colourful flowers provides cues to care (Nassauer, 1995b; Hitchmough, 2004b). Negative perceptions are common when tall grasses dominate vegetation and colourful flowers are lacking; However, adding colourful flowers to such scenes mitigated the negative effect of height, resulting in tall and colourful vegetation being preferred by the public as shorter and colourful vegetation (Hitchmough and Fleur, 2006). According to Hoyle, Hitchmough and Jorgensen (2017), dramatic displays of flower colour can enhance people's aesthetic experience in the short term, while 'background' green planting is more likely to provide psychological restoration. Except for green colour, which holds significant value beyond the flowering period, a British study revealed that white, blue, and orange were the most favoured colours for flowers (Zhang, Dempsey and Cameron, 2023). People in Sapporo, Japan preferred ordered compositions of bright colours such as purple on the street, as compatibility of vegetation colour of purple and green with the surrounding streetscape colour of grey (Todorova, Asakawa and Aikoh, 2004). In contrast, Chinese research emphasizes the preference for a simple and light colour palette in natural

planting, characterized by a prevalent green tone with sporadic additions of red and yellow hues (Guo, 2022). It is noteworthy that red and yellow are the two colours of the Chinese national flag and are frequently found in Chinese planting designs. These colours hold symbolic significance and can be observed in practical design cases (Figure 2.4). However, research on colour symbolism in Chinese landscapes remains scarce.

Figure 2.4 A planting design case in China. The colours of the planting are mainly red and yellow (photographed by the author in 2019)

The awareness of biodiversity and species richness regarding plant species and wildlife plays a pivotal role in shaping perceptions and preferences for naturalistic landscapes. Studies have indicated that participants' assessments of naturalness were linked to ecological naturalness, though not precisely identical (Lamb and Purcell, 1990). Perceived levels of biodiversity and species richness within urban spaces have shown significant connections to site satisfaction and feelings of connectedness to nature, contributing to restoration experiences (Fisher *et al.*, 2021). The perception of richness has been positively correlated with vegetation height, evenness, and colourfulness, which serve as indicators for estimating species richness (Southon *et al.*, 2018).

According to Rhode and Kendle (1997), a sense of unpredictability and vitality in urban wildlife contributes to people's enjoyment, as it represents a loss of control that is both exciting and subversive. Different reactions to urban wildlife may therefore reflect people's feelings towards this loss of control. Cameron *et al.* (2020) discovered that in a survey of 945 British urban greenspaces, the public reported more positive emotions when they perceived higher levels of overall biodiversity, particularly regarding the presence of abundant wildlife. In Özgüner and Kendle (2006) research, the naturalistic landscapes featuring wildlife as a prominent element were the preferred choice for public greenspaces.

Furthermore, public preferences for plantings are influenced by both aesthetic and non-visual traits of the vegetation. Aesthetic traits such as flower size, leaf width, and foliage colour, as well as non-visual traits like nativeness and drought tolerance, have an impact on public preferences (Kendal, Williams and Williams, 2012). Notably, studies have indicated that a majority of respondents prefer plants with large flowers, tussock-forming perennials, and broader leaves, which are indicative of high resource availability (Heerwagen and Orians, 1995).

In summary, preferences for naturalistic landscapes can fluctuate based on the influence of diverse aesthetic characteristics as observed in various research studies. Recent investigations indicate a growing inclination among urban residents towards embracing plantings characterized by diverse vegetation structures, vibrant colours, varied species, and the presence of wildlife, all while fostering a sense of human care and connection with nature.

2.3.3. Cultural background and socio-demographic factors

In early landscape research, individuals' background characteristics were highlighted in terms of landscape perception and preference, which were discussed across three distinct dimensions: familiarity and experience related to the environment, cultural and ethnic variations including age-related subculture factors, and formal knowledge and expertise concerning environmental contexts (Kaplan and Kaplan, 1989). Subsequent research has shown that these background characteristics used in landscape studies are significantly influenced by both cultural rules and personal modes (Bourassa, 1991a; Jorgensen, 2004). Cultural factors encompass elements such as cultural conventions and norms (Nassauer, 1995a; Nassauer, Wang and Dayrell, 2009), cross-country influences in shaping attitudes (Rohde and Kendle, 1994), and individual innate perspectives, such as anthropocentric or ecocentric viewpoints (VandenBorn *et al.*, 2001). Biological traits of individuals typically include age, sex, and race, alongside a set of socially defined criteria known as sociodemographic characteristics that affect landscape perception. These criteria encompass ethnicity, religion, socioeconomic status, occupation, and membership in various social groups (Bourassa, 1991b; Calogiuri, Patil and Aamodt, 2016).

Numerous studies have taken into account multiple factors when examining perception and preference. Lyons (1983) examined demographic correlates of landscape preference, particularly vegetational biomes, with a focus on age, gender, and residential experience. López-Martínezn (2017) investigates the influence of age, gender, and education level on visual preferences for Mediterranean landscapes. Hoyle (2020) addresses sociocultural aspects in the perception of urban nature, including gender, education, professional background and ethnicity. Fischer *et al.* (2018) consider participants' migrant backgrounds when conducting surveys in multicultural European cities.

Age

Age is a pivotal personal factor influencing landscape preference across various research studies. Herzog *et al.* (2000) find that Australian young children exhibited higher preference ratings than teenagers, likely due to perceiving landscapes as playful spaces. Ode Sang *et al.* (2016) demonstrate that urban greenspaces were associated with higher aesthetic values and well-being among older residents compared to younger individuals in Gothenburg, Sweden. Similarly, Jorgensen and Anthopoulou (2007) noted that British older participants valued urban woodland more due to linked memories and past nature experiences. However, the perception of their frailty, decreased mobility, and vulnerability contributed to older individuals' heightened fear of woodlands.

Gender

The effect of gender on perception has varied in different studies. Lyons (1983) suggested that gender had a less significant impact on perception compared to age and residential experience. In contrast, gender assumed a pivotal role in research concerning urban landscape perceptions of safety, as highlighted by Valentine (1989) and Jorgensen, Hitchmough and Calvert (2002). These studies found that women tend to feel more fear in urban landscapes than men, particularly evident when participants rated 15 photographic images of woodland scenes with various elements in the UK.

However, in the context of multicultural European cities, Fischer *et al.*, (2018) discover a different pattern. Female participants assigned a higher value to forests with medium to high levels of plant species richness compared to male participants. This finding was derived from the evaluation of photographic images from four distinct urban greenspace types. Additionally, in research involving over 4,000 Swiss children aged 8 to 16, it was observed that girls, particularly among young participants, were more adept at recognizing subtle changes in individual species compared to boys (Lindemann-matthies, 2002).

Education

Education has emerged as a significant determinant within the framework of social class, as evidenced by Buttel and Flinn's (1978) research. De Groot and Van Den Born (2003) extend this understanding by demonstrating that participants from the Netherlands with lower levels of education tended to express a preference for man-made and park-like landscapes. Conversely, individuals with higher levels of education exhibited a stronger inclination towards landscapes characterized by a sense of grandeur and natural forces, as revealed in their research on landscape type preferences.

This educational influence extended to Australia as well, where higher-educated participants displayed a preference for native plants due to their recognition of broader environmental benefits. This connection was established in a study investigating the relationship between plant traits and preferences (Kendal, Williams and Williams, 2012). Moreover, the impact of education reaches into the next generation. Zheng, Zhang and Chen (2011) found that American parents with better educational backgrounds were more likely to have children who preferred natural landscapes.

Occupation and professional background

Occupation and professional background have been identified as important factors to consider when researching social attitudes towards natural landscapes. For instance, a study conducted by Van Den Berg, Vlek and Coeterier (1998) revealed that Dutch farmers, in comparison to other professions and areas of expertise, tend to prefer a more structured landscape rather than naturalistic ecological plantings in urban areas. In contrast, professionals from parks or private landscape practices acknowledge the various values associated with naturalistic landscapes in the UK urban settings (Özgüner, Kendle and Bisgrove, 2007). Similarly, American students with a background in environmental science tend to favour naturalistic planting styles over well-maintained environments that are preferred by students studying agricultural economics, horticulture, and social sciences (Zheng, Zhang and Chen, 2011).

Familiarity and childhood experience

Familiarity has been identified as a significant factor in influencing landscape preference, as highlighted by Kaplan and Kaplan (1989). They emphasize that familiarity can exert a notable impact on individuals' preferences for landscapes. Furthermore, they suggest that one way to gauge familiarity is through the concept of 'residence', implying that people tend to become more familiar with the landscapes they live in. However, the research also underscores that familiarity alone cannot fully explain individual preferences. It must be

considered alongside people's reactions to their surroundings, as preference appears to have a positive correlation with familiarity.

A study conducted by Herzog *et al.*, (2000) provides insight into how familiarity affects preference by comparing the landscape preference of Australians and Americans for an Australian natural landscape. The findings reveal that Aboriginal participants, who are more familiar with the native landscape, displayed a higher preference for it compared to foreign participants. This suggests that familiarity contributes to a stronger preference. Similarly, Howley (2011) suggests that rural respondents exhibit a stronger preference for 'water-related landscapes', which can be attributed to their greater familiarity and experience with such environments.

Nevertheless, there are exceptions to the relationship between familiarity and preference. Van Den Berg, Vlek and Coeterier (1998) point out that familiarity did not play a significant role in the assessment of rough nature development plans. An earlier study by Kaplan (1977) also demonstrated that local citizens showed lower preferences for roadside scenes compared to visitors. These instances indicate that preference is not always directly linked to familiarity.

Childhood experience also holds relevance in understanding landscape preference. Thompson, Aspinall and Montarzino (2008) suggest that childhood experiences can predict the frequency of visiting woodland and greenspace in adulthood. Lack of exposure to green spaces during childhood could potentially discourage individuals from visiting such places as adults. However, Cleary *et al.* (2020) propose that even in the absence of childhood exposure to nature, individuals can still form a strong positive connection with nature through their current experiences.

Ethnicity and migration background

Studies such as Rishbeth (2001), Buijs, Elands and Langers (2009) and Hoyle (2015) have highlighted the significant and intricate role of ethnicity and migration background in perception research related to natural landscapes and naturalistic planting. Evidence suggests that ethnicity may also be associated with perceptions of 'tidiness and care' (Hoyle, 2015) as well as 'restorative effect and care' (Hoyle *et al.*, 2018). In terms of migration background, as pointed out by Rishbeth (2016), migrants' assessments of their surroundings are often shaped by their past experiences and expectations of their living environments. Buijs, Elands and Langers (2009) discover that while native Dutch individuals tend to favour wilderness, immigrants generally lean towards functional landscapes. Fischer *et al.* (2018) indicate that Asian migrants perceived a higher biodiversity level in parks and forests as less contributory to liveability compared to the average while valuing streetscapes

more positively. Furthermore, this difference in attitudes diminishes among descendants of migrants, as they evaluate scenes in a manner similar to non-migrant respondents.

2.3.4. Current Chinese research on urban greenspaces and landscape perception and preference: Identifying the gaps

The research on the historical phases of Chinese Landscape Architecture development indicates that the year 1984 serves as a significant milestone, as the discipline of landscape architecture was influenced by Western landscape architects. In 1992, the first authorized law was introduced to support and emphasize the natural attributes of urban greenspace. In 2000, a national policy-level strategy promoting ecological environment protection was proposed, coinciding with the emergence of increased discipline development, research, and practical projects (He and Zhao, 2022). This suggests that Chinese research on urban nature and landscape perception has lagged behind Western research.

An expanding body of research conducted in China demonstrates a strong demand for urban nature. However, current environmental concerns and awareness related to wildlife habitat, species conservation, and other ecosystem services remain weak. For instance, a study revealed that urban residents across 101 cities highly value parks and green spaces, despite air pollution being a significant challenge in China and a deterrent to visiting these spaces due to cardiovascular health concerns. Surprisingly, over a third of respondents, particularly those with lower education levels continued to visit parks even during periods of high pollution without wearing masks (Huang *et al.*, 2023). This indicates a significant demand for urban nature among the Chinese public. Zhang *et al.* (2020) highlight that the public is willing to pay more for air quality regulation services provided by urban green infrastructure, given the severity of air pollution in urban areas.

However, concerning ecological benefits, research shows that there is a lack of concern over environmental issues among the public in western China. In the east-coastal region, higher-paid urban residents show more concern for the environment and have the potential to advocate for environmental enhancement (Liu and Mu, 2016). In southern China, limited concern and awareness regarding wildlife habitat, species conservation, and ecosystem services have been observed (Jim and Chen, 2006). Despite a strong preference for naturalistic-ecological landscape design, the limited acknowledgement of wildlife habitat and species conservation roles indicates a primary perception of the landscape as a visual-scenic resource complementing recreational activities.

Regarding attitudes to urban nature and greenspace, Wang, Zhao and Liu (2016) found that Chinese people's attitudes towards urban nature are significantly influenced by landscape types. The descending order of mean scores of visual aesthetic quality was urban greenspaces, followed by forest and farm, and lastly, urban landscapes with hard pavement. Furthermore, Chinese respondents held varying expectations of the functional aspects of urban greenspaces, including auditory, tactile, olfactory, and visual quality, as well as overall recreational needs (Chen, Adimo and Bao, 2009). Zhang et al. (2013) suggest that the preferences of respondents regarding the type of greenspace they choose are influenced significantly by ambience and accessibility. Moreover, their research using on-site questionnaires with 364 local residents contributes to socio-demographic findings, revealing that males under 45 have more recreational options, resulting in lower demand for green space. Additionally, urban greenspaces are more beneficial for low-income and low-educated individuals, as they derive more social benefits from it compared to those with higher socio-economic status.

Regarding the perception and preference of urban planting, few studies have explored the impacts of vegetation structure and visual colour. Regarding vegetation structure, research indicates that moderately dense vegetation is preferred by respondents, while densely spaced woody plants are not as attractive (Zhang *et al.*, 2013). Additionally, increasing crown density, decreasing plant litter, enhancing trunk colour, reducing tree species diversity, and increasing visible distance were found to enhance scenic beauty (Chen *et al.*, 2016). In terms of colour, park visitors prefer lawns due to their tidy appearance, with the main colour being green, and groundcovers featuring bright and colourful flowers (Yang *et al.*, 2019). However, wildflower meadows received the lowest satisfaction rating in the Chinese urban context compared to manicured lawns, monocultures, and flowerbeds (Jiang and Yuan, 2017). Non-professional respondents appreciated meadows with a colourful appearance. Du *et al.* (2016) suggest that visitors prefer strong colour contrast and mixed use of evergreen and deciduous plants in urban vegetation landscapes.

Most research on landscape perception in China has utilized photography selection methods to capture various landscape elements. According to Luo *et al.* (2018), natural elements in surveyed photos like mountains, woodlands, lakes, and grass are more easily perceived and preferred. Wang *et al.*, (2019) found that participants preferred images with more trees, flowers, water, and fish, which also increased the restorative potential and had a strong positive relationship with aesthetic preference. However, due to limitations in research methods - photography selection, the choice of images might be influenced by factors like element size, position, and colour.

Reiterating the research gaps

Despite the increasing research on landscape perception and preference for urban planting in China, very limited studies offer a clear definition of planting categorization. The inadequate identification and description of urban green space typologies might result in a limited and imprecise understanding of public perceptions and preferences.

Liu (2010) presents evidence that natural planting communities are most preferred, scoring higher than highly designed and manicured planting communities, particularly those with well-trimmed features. This conclusion was drawn from a photo-selection survey involving 105 participants. Among the photos, those depicted below (Figure 2.5) received the highest aesthetic scores. Notably, Fig 3-1 P18, Fig 3-3 P6 and Fig 3-4 P13 were identified as representative of natural planting communities. However, it is apparent that highly designed and manicured elements, such as well-trimmed shrubs, artificial rocks, and manicured lawns, still dominate a large portion of the photos.

Figure 2.5 Photos used in the Liu's research (Liu, 2010)

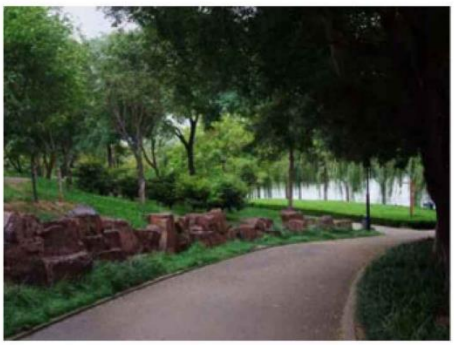


图 3-1 P18
Fig.3-1 P18

图 3-2 P12
Fig.3-2 P12

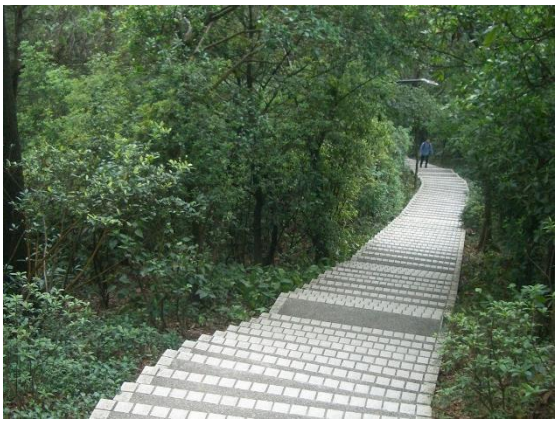
图 3-3 P6
Fig.3-3 P6

图 3-4 P13
Fig.3-4 P13

Similarly, Jim and Chen (2006) point out that the naturalistic-ecological style landscape in urban green spaces was the most preferred due to its sense of mystery, variety, and intimacy with nature. This conclusion was drawn from on-site interviews with 340 respondents. In their research, they identified that hybrid oriental-Western integration, pure oriental, and pure Western styles were less favoured by the participants. However, the definitions of these vegetation types— 'naturalistic-ecological', 'oriental', 'Western', and 'oriental-Western' —were not provided in their study.

Baiyun Mountain Park was considered a representative example of a desirable natural green space with naturalistic-ecological landscape designs in 2006 in their research, but unfortunately, the research lacked photographic documentation or comprehensive descriptions detailing its overall or specific vegetation types. Photos of the current planting at Baiyun Mountain Park was sourced and is displayed below (Figure 2.6), showcasing evidence of a diverse range of vegetation types, including green sculptures, pruned shrubs, and mown grass.

Figure 2.6 Photos of the current landscape in Baiyun Mountain Park
(https://www.tripadvisor.co.uk/Attraction_Review-g298555-d490438-Reviews-Baiyun_Mountain-Guangzhou_Guangdong.html)

(a) 

(b) 

(b) 

(d) 

Figure (a) above depicts untrimmed understories alongside paths; Figure (b) and (d) exhibit colourful patterned plantings, and Figure (b) also has neatly mown grass; while Figure (c) showcases green sculptures, pruned shrubs and mown grass.

In the study conducted by Wang, Zhao and Liu (2016), the preferences of 144 valid respondents were examined through a photo-selection questionnaire. The results indicated that 'urban green space' and 'forest' were the most preferred categories among the participants which is represented in Figure 2.7. Interestingly, the research suggested that the perceived level of naturalness for 'urban greenspace' was rated higher than that for 'forest'. However, this nuanced distinction in naturalness was not effectively conveyed through the provided photos. Notably, the photo depicting the 'forest' included features like mown grass and pruned shrubs, which did not accurately capture the genuine natural environment of a forest. This discrepancy in photo representation underscored the challenge of accurately communicating different levels of naturalness through static images.

Figure 2.7 Photos used in Wang, Zhao and Liu's research: Urban green space (top) and forest (bottom) (Wang, Zhao and Liu, 2016)

Furthermore, the existing body of research concerning public preferences for naturalistic urban planting in China remains limited. Up to this point, a systematic and comprehensive study that investigates the specific characteristics preferred in naturalistic planting has yet to be conducted. As a result, the extent to which the Chinese public embraces this type of planting approach remains uncertain. This research gap highlights the need for more extensive, focused and precise investigations into the public's attitudes and receptiveness towards naturalistic planting in urban environments.

2.4. Methodological approaches to public perception and preference

Research on public perceptions and preferences has played an important role in landscape research and design practices. As a landscape architect, the knowledge of people's preference for and interpretation of different types of landscapes was required to provide the theoretical foundation for the modification and improvement of the landscape. Jorgensen (2004) emphasizes that landscape research aims not only to determine the visual preference of landscapes, but also to uncover the complexity of public response, encompassing individuals' needs, experiences, and interpretations of landscape perception. Studies of public environmental attitude have traditionally employed either quantitative methods such as questionnaires (Baharudin, 2020; Robinson *et al.*, 2020) and structured observation (Kothencz *et al.*, 2017), or qualitative methods such as interviews (Hoyle *et al.*, 2017; Weissgerber, Chanteloup and Bonis, 2023).

However, the combination of both methods has been increasingly utilized in many research studies to provide a more comprehensive understanding of public perceptions and attitudes toward the environment. Bryman (2016) introduces that sequential explanatory research requires that the collection and analysis of quantitative data precede the collection and analysis of qualitative data to explain quantitative findings. Thus, much previous research has firstly achieved a general statistical pattern and relationship of perception and preference assessment, then deeply explored the underlying causes of their attitudes to get a specific interpretation in depth (DeGroot and Van den Born, 2003; Jorgensen, 2003; Hoyle, 2015; Nam and Dempsey, 2019; Gai *et al.*, 2022).

In addition to physical on-site surveys, visualisation techniques, regarded as a practical tool, have gained prominence in landscape perception and preference research (Liu and Schroth, 2019). These techniques involve the creation of visual scenarios, as people tend to comprehend information more readily through images than other formats (Tahvanainen *et al.*, 2001). This includes various methods such as original and manipulated photographs as well as the use of virtual landscape simulators (Karjalainena and TyrvaÈinen, 2001).

Photograph-based visualisation is considered a cost-effective and convenient method to control the variables that can affect environmental evaluation, such as weather, time, and spatial conditions. This method was widely applied to many studies, through original photographs (Heyman *et al.*, 2011; Jiang and Yuan, 2017; López-Martínez, 2017) and digital editing of photomontage (Todorova, Asakawa and Aikoh, 2004; Wang, Zhao and Meitner, 2017; Wang *et al.*, 2019). However, the use of photographs in surveys is usually criticised because it is incapable of representing the whole richness of nature concerning the real dimension, interaction and details (Karjalainena and TyrvaÈinen, 2001). Similarly, Chen, Adimo and Bao (2009) address that the photographer's incompetence and bias in selecting scenes, photos, panels, and respondents can lead to a

biased representation of the intended area, as only salient features in images may be captured. Furthermore, Luo *et al.* (2018) suggest that water elements are more readily perceived and identifiable, with elements positioned in the middle or lower sections of photographs, often featuring a substantial area, regular shape, or smooth boundaries.

Virtual landscape simulators, which are based on photograph visualization, offer automated and instant visualization, as well as flexible movement within the landscape. It become popular in recent years with the development of virtual reality technology (Lappi, 2015). A study shows that immersive virtual reality experiences of nature can have similar restorative effects as real-world physical experiences of nature, providing a viable alternative when physical access to natural environments is difficult (Reese, Stahlberg and Menzel, 2022). However, the inadequate technical accuracy of the landscape presentation may not provide a realistic and valid natural scene for participants, which can lead to problems with data integrity (Karjalainena and TyrvaÈinen, 2001).

On-site visits may be considered costly and restrictive in scenarios involving adverse weather and difficult topographic conditions (Karjalainena and TyrvaÈinen, 2001), on the other hand, they can guarantee the highest validity and remedy the deficiencies mentioned above, including issues with technical accuracy, the choice of viewpoint, data integrity, the trip movement, and additional sensory experiences like sounds, smells, and texture perceptions. This approach has been used widely in many investigational studies (Hoyle, 2015; X. Zhang *et al.*, 2020; Krapez, Hughes and Newsome, 2021). Ittleson (1973) points out that the environment is immensely felt and experienced through the senses rather than visually perceived. Besides, eye-tracking techniques can be achieved based on on-site visits to capture visual engagement with surrounding environments (Cottet *et al.*, 2018; Simpson, 2018).

Furthermore, a large and growing body of literature on nature-relatedness focuses on the measurement scale of the human-environment relationship. Studies of scale have traditionally relied upon self-reporting. Weigel and Weigel (1978) proposed a widely used self-reported Environmental Concern Scale (ECS) to measure individuals' attitudes toward environmental issues. Based on this scale, Thompson and Barton (1994) involved ecocentric-anthropocentric distinction to explain the independence of behaviour relevant to the environment. To further investigate human-nature relationships, Dunlap *et al.* (2000) carried out a series of experiments by adopting and developing the New Ecological Paradigm Scale (NEP). The study of NEP explained the interaction between humans and nature; however, the personal traits aspects were not considered. The connection to the Nature scale (CNS; Mayer and Frantz, 2004) extended the research on the individual's affective and nature's experiential connection. By drawing on the concept of Inclusion of Nature in the Self scale (INS; Schultz, 2002), Nisbet, Zelenski and Murphy (2009) proposed a different way in which to measure individuals' connection to nature - the Nature Relatedness (NR) scale.

The NR scale stands out as one of the most effective approaches for describing people's connectedness with the natural world. This scale serves as a means to measure environmental attitudes and predict specific environmental behaviours that other scales, such as NEP, may not capture. Those individuals who score highly on the NR scale often demonstrate heightened biophilic inclinations. These tendencies encompass a genuine appreciation for nature, a sense of empathy toward all facets of the natural realm, and a preference for environmentally friendly products (Schultz, 2000; Nisbet and Zelenski, 2013; Aruta and Pakingan, 2022).

NR scale contains 21 statements and uses the 5-point Likert scale. Three factors can be identified from those 21 questions: NR-Self to express the self-identification with nature, NR-Perspective to reflect an external worldview about nature, and NR-Experience to represent a nature-related physical familiarity. Considering the time or space would be limited when applying a 21-item NR scale in a site survey or comprehensive test, a brief 6-item NR measure (NR-6) was developed by Nisbet and Zelenski (2013). As a short-form version of the NR scale, NR-6 provides a similar pattern as the NR scale regarding NR-Self and NR-Experience dimensions. NR-perspective was omitted in the NR-6 as authors deduced that NR-Experience is more relevant to pro-environmental attitudes than nature-relatedness.

2.5. Summary

This chapter has discussed the significance of incorporating naturalistic landscape design in creating sustainable and liveable urban green spaces, highlighting the Chinese notion of nature's emphasis on nature and the public's long-standing desire for a connection with it. The chapter reviewed existing research on public perceptions and preferences for naturalistic landscapes in both global and Chinese contexts, while identifying research gaps in the field. This chapter has also reviewed different research methodologies that have been employed to study public perceptions and preferences for naturalistic landscapes, each with its own strengths and limitations. The next chapter will delve into the methodology used to examine the perception and preferences of Chinese greenspace users, as well as the underlying rationale behind their choices.

| Chapter 3 : Methodology

The previous chapter delved into the existing research findings on perception and preference, as well as the methodology employed in the investigation. In order to address the research questions effectively, the strategy requires incorporating diverse greenspaces with distinct vegetation communities. This approach involves a combination of mixed methods, including in situ questionnaires and interviews, to explore both general attitudes and nuanced individual interpretations thoroughly (Table 3.1).

Table 3.1 Research questions, sub-themes, survey sites and survey methods

Research question	Sub-themes	Survey sites	Methods
Question 1: **How do Chinese greenspace users recognise and define 'nature'?**	**Frequency of and Reasons for visiting nature, and preferred types of 'nature'**	[all sites]	Questionnaire
	Representation and definition of nature	[all sites]	Questionnaire & interview
	Perceptions of vegetation in real nature	Real nature	Questionnaire & interview
	Concerns about nature	Real nature	Questionnaire & interview
	Nature relatedness	[all sites]	Questionnaire & interview
	Interests in nature and childhood nature experiences	[all sites]	Questionnaire & interview
Question 2: **How do Chinese greenspace users recognise and evaluate 'urban greenspace'?**	**Thoughts on the relationship between the city and nature**	[all sites]	Interview
	Attitude to urban greenspaces	[all sites]	Interview
	Beliefs and values related to the urban environment	[all sites]	Questionnaire
Question 3: **How do greenspace users perceive naturalistic planting in urban areas?**	**Comparison between NP and CP in urban park scale**	Urban parks	Questionnaire & interview
	Comparison between NP and CP in designed show garden scale	Show gardens	Questionnaire & interview
	Comparison between real nature and NP in urban parks and show gardens	[all sites]	Questionnaire & interview
	Perceived and preferred characteristics of NP	[all sites]	Questionnaire & interview
Question 4: **Are greenspace users' beliefs and values and socio-demographic factors drivers of these responses?**		[all sites]	Questionnaire & interview

3.1. Selection of the landscapes used in the research

Beijing was selected as the location for research. As the capital of China, Beijing has a variety of types of greenspaces with various planting styles. In recent years, under the promotion of eco-city construction, the Beijing government has displayed a keen interest in preserving the natural environment, elevating biodiversity and actively supporting innovative approaches to urban landscape design. This has resulted in the emergence of relatively less human-intervened natural areas on the outskirts of the city and the initiation of numerous naturalistic planting projects within urban areas. Additionally, the city has been a testing ground for a range of innovative and well-developed projects, the outcomes of which are anticipated to exert a profound influence on landscape development strategies across other Chinese cities. Hence, Beijing emerged as the most fitting urban setting to assess public attitudes to naturalistic planting.

Within Beijing, a deliberate selection was made of three diverse vegetation communities and three distinct scales/scenarios. These encompassed a national nature reserve and two greenspace sites under the urban context, i.e., an urban park and show garden, each serving distinct purposes.

The categorization of the five research sites along two dimensions, based on vegetation community type and scale, is outlined in

Table 3.2. These sites exhibited a spectrum of sizes, ranging from the extensive 20,000 hectares of Baihua Mountain National Nature Reserve (BM) to the more contained 50 hectares of Lotus Lake Park (LLP) and the compact 0.15 hectares of the show gardens at the Beijing International Exposition (Beijing Expo 2019).

The type of vegetation communities present at these sites was classified into three categories: ranging from natural to semi-natural at Baihua Mountain National Nature Reserve, nature-like designed naturalistic planting at Woodland Park in Lotus Lake Park and ‘New Silk Road’ Garden in Expo, and conventional strongly patterned ornamental planting at Traditional Park in Lotus Lake Park and Beijing Garden in Expo. For further clarity, refer to Table 3.3 and Table 3.4.

Table 3.2 Framework for categorisation of research sites: Five research sites selected in two dimensions of vegetation community types and scale

	Type **Natural** → **Horticultural**		
	Natural to semi-natural	Nature-like/designed naturalistic planting	Conventional strongly patterned ornamental planting
Scale			
Large 20,000 ha+	 Rural nature reserve (Baihua Mountain)		
Medium 50 ha+		 Nature-like designed urban park (Woodland Park in Lotus Lake Park)	 Traditional cultural urban park (Traditional Park in Lotus Lake Park)
Small 0.1 ha+		 Nature-like designs show garden ('New Silk Road' Garden in Expo)	 Traditional cultural show garden (Beijing Garden in Expo)

Table 3.3 Specific category of three types of vegetation communities and detailed typology description

Semi-natural (rural) vegetation community	Designed semi-natural (urban) vegetation community	Designed conventional vegetation community
		
Appearance: Natural → Formal		
Species diversity: High → Low		
Pattern: Non-geometric → Geometric		
Layer: Multilayered → Simple		
Degree of intermixture: High → Low		
Boundary: Fuzzy → Clear		
Openness: Close → Open		
Detailed typology description:		
Multi-layered woodland system, Including main canopy mature trees, sub-canopy layers, shrub layers and ground layers. Random mixing of individual species without any pattern.	The main canopy layer is mature trees with a single shrub layer and a ground layer. Still a high degree of openness. Repetition of 'blocks' of species throughout planted mass creates a more mixed effect.	Single layer isolated mature trees in amenity mown grass/or under bedding. High degree of openness. Clipped forms are present indicating human care.

Table 3.4 Specific category of three scales/scenarios and detailed typology description

	Semi-natural forest in nature reserve		Urban Park		Horticultural Show Garden
					
Scale:	Large	→		→	Small
Function:	Nature-oriented	→		→	Human-oriented
Visual impact:	Mild	→		→	Intense
Ecological value:	High	→		→	Low
Wildlife:	Many	→		→	Less
Vegetation existence:	Long	→		→	short
Community stability:	Stable	→		→	Unstable
Dominate Plant species:	Many	→		→	Less
Senescence:	Natural	→		→	Controlled
Taxonomic complexity:	High	→		→	Low
Productivity:	High	→		→	Low
Management requirement:	Low	→		→	High
Maintenance requirement:	Low	→		→	High

Detailed typology description:

Usually on a very large scale, naturally formed, remote from the city, with centuries of history, has very little human intervention and a stable community and ecosystem. Except for the necessary maintenance of sanitation around the public resting areas, basically, no other effort to maintain the forest.

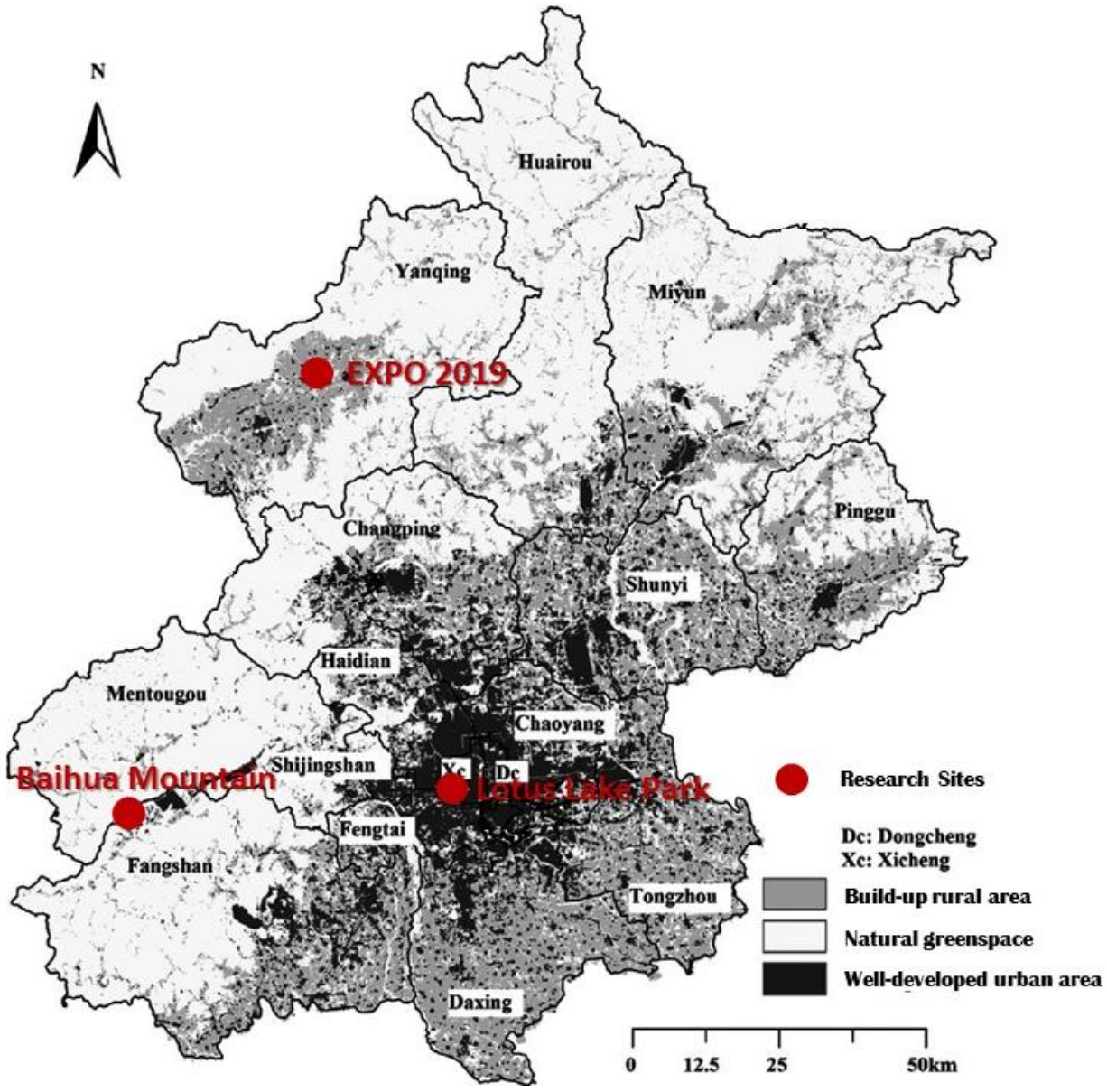
The median scale, designed In a city with decades of history, has different functions but mostly meets human activity and natural aesthetic needs simultaneously. Some parks may replace dead plants for some reason (festival, visual reason…).

Usually, on a small scale, designed for the temporary exhibition, it takes months from construction to display. It is mainly used for exhibitions on design concepts, planting techniques, and public education. To achieve high visual impact during a long period of the exhibition, plants will be replaced regularly in some gardens.

The rationale behind the selection of these specific sites was driven by the desire to comprehensively explore responses to vegetated landscapes across a spectrum of factors. These encompassed gradients in scale, the perceived level of naturalness both in the greenspace and its surrounding context, the extent of design intervention, the intensity of maintenance practices, the structure and pattern of plant communities, as well as the age and degree of establishment of the plantings. Further elaboration on these themes is provided in Sections 3.1.1 Baihua Mountain, 3.1.2 Lotus Lake Park and 3.1.3 EXPO 2019.

The map of Beijing and the location of each research site are shown In the following Figure 3.1.

Figure 3.1 Map of Beijing City and the location of each research site (Map was remade based on Zhao *et al.* (2013))



3.1.1. Research Site 1: Baihua Mountain National Nature Reserve (BM)

Beijing Baihua Mountain National Nature Reserve is located in Qingshui Town, Mentougou District, 100 km west of Beijing, and has rich biodiversity and a unique natural landscape. The nature reserve covers a total area of 21743.1 hectares with a forest coverage rate of 96%. The central peak of Baihua Mountain is 1991 metres above sea level, and the highest peak, Baicaopan, is 2049 meters above sea level. This area has a typical temperate continental monsoon climate: warm and rainy in summer and cold and dry in winter. The annual precipitation is 450 ~ 720mm, of which 74% is concentrated from June to August. Figure 3.2 presents the summer and autumn scenes in the same location.

Figure 3.2 Summer and autumn scene on the main path up to the summit of Baihua Mountain (top two images – summer, bottom two images – autumn)

The picture on the left depicts the interior of the woodland, and on the right, there is a distant view of the nature reserve. From the photos, it can be seen that due to the different dominant tree species, there are significant colour changes in different seasons. Additionally, the left image shows that the shrubs on both sides of the path are very dense and disordered. Except for the hard-paved path, there are no other human traces.

This nature reserve protects a secondary deciduous broad-leaved forest ecosystem plus high-altitude meadows. There are 1100 species of higher plants, including 30 species of bryophytes, 38 species of ferns, 19 species of gymnosperms, and 1013 species of angiosperms, accounting for 49% of the total species of plants in Beijing (*Beijing Baihua Mountain National Nature Reserve_Baidu*, 2021). According to Zhang *et al.* (2020) and Hongbo and Feng (2021), the vertical structure of the BM forest communities could be classified into three layers: tree layer, shrub layer and herbaceous layer (Table 3.5). The dominant tree species include *Quercus mongolica*, *Betula platyphylla, Juglans mandshurica, Betula davurica, Larix principis-rupprechtii* and *Populus davidiana* communities; the dominant shrub species are *Rubus crataegifolius, Deutzia grandiflora, Spiraea pubescens, Clematis ochotensis and Syringa oblata*; and the dominant herbaceous species include *Carex lanceolata* and *Deyeuxia arundinacea*.

Table 3.5 Dominant species within the typical plant communities in BM (Zhang *et al.*, 2020)

Community	Tree layer	Shrub layer	Herbaceous layer
***Betula platyphylla* Forest**	*Betula platyphylla* *Ulmus pumila* *Betula davurica*	*Deutzia grandiflora* *Lonicera chrysantha* *Spiraea pubescens*	*Carex lanceolata* *Vicia unijuga* *Deyeuxia arundinacea*
***Juglans mandshurica* Forest**	*Juglans mandshurica* *Larix principis-rupprechtii* *Syringa pekinensis*	*Spiraea pubescens* *Deutzia parviflora* *Dioscorea nipponica*	*Carex lanceolata* *Deyeuxia arundinacea* *Agastache rugosa*
***Betula davurica* Forest**	*Betula davurica* *Quercus mongolica* *Acer mono*	*Clematis ochotensis* *Rubus crataegifolius* *Rosa bella*	*Iris ruthenica var. nana* *Carex lanceolata* *Deyeuxia arundinacea*
***Larix principles-rupprechtii* Forest**	*Larix principis-rupprechtii* *Quercus mongolica* *Betula davurica*	*Rubus crataegifolius* *Clematis ochotensis* *Spiraea pubescens*	*Carex lanceolata* *Deyeuxia arundinacea* *Aster ageratoides*
***Quercus mongolica* Forest**	*Quercus mongolica* *Betula davurica* *Ulmus pumila*	*Rubus crataegifolius* *Spiraea pubescens* *Spiraea trilobata*	*Carex lanceolata* *Deyeuxia arundinacea* *Vicia unijuga*
***Populus davidiana* Forest**	*Populus davidiana* *Betula platyphylla* *Sorbus pauhuashanensis*	*Syringa oblata* *Corylus mandshurica* *Acer mono*	*Maianthemum bifolium* *Carex lanceolata* *Impatiens noli-tangere*
Meadow			*Ophiopogon chingii* *Deyeuxia arundinacea* *Carex lanceolata*

BM is 100 kilometres from the Beijing urban area and has convenient public transportation. Summer visitors come to escape the heat, the average temperature of Baihua Mountain in July and August is 22 degrees C. In October, tourists come to see the autumn foliage of the woodland. Baihua Mountain is open to tourists every day from early May to the end of October. The adult ticket price in 2021 was 40 CNY (About 4.4 GBP, exchange rate: 1 GBP = 9 CNY, the same for the following), with a half-price discount for students and free tickets for children and older people above 65.

3.1.2. Research Site 2: Lotus Lake Park (LLP)

Lotus Lake Park is a historic city park in central Beijing. It covers a total area of around 53.6 hectares, containing 22.27 hectares of water (*Lotus Lake (Beijing Lotus Lake Park)_Baidu*, 2021). The LLP is located at the confluence of the Haidian and Fengtai Districts on the West Third Ring Road of the city. It has convenient transportation because of Beijing West Railway Station and many adjacent subway stations.

As the park's name indicates, the LLP is famous for the Lake and its lotus flowers; its long history is also well-known. The site of Lotus Lake existed long ago during the Zhou Dynasties (about BC1029), while Jicheng, the predecessor of Beijing city, originated nearby. Thus, Lotus Lake is considered the cradle of Beijing (Fengtai District Toponymic Records Editorial Committee, 1993). Lotus Lake was not only an important water source in ancient Beijing city during the Jin Dynasty (about AD1115 -1234) but also a tourist attraction in the Ming and Qing Dynasties (about AD1368 -1911). During the late 20th century, the Beijing government began to dredge Lotus Lake, control pollution and rebuild the park. Tourists were officially received in the LLP in December 2000.

Nowadays, the LLP has become a well-known free-access park integrating entertainment, rest and education. In May 2019, a 4.2 hectares extension to the south of the LLP was completed, involving a designed native woodland with understory shrub and herbaceous plant layers to create a similar structure to what is found on Baihua Mountain. As the most woodland-like planting in Beijing, this area was chosen for the research and contrasted with a more conventional area within the main park. Access to both the new woodland area and the conventional park was free.

Figure 3.3 below shows a map of the LLP. The native woodland extension is labelled as WP; the conventional area used in the research is TP. Arrows indicate access points into the park; letters indicate the location of the pictures shown below.

Figure 3.3 Map of the Lotus Lake Park (LLP)

(White translucent area: surveyed areas; White dashed line: park boundaries; Arrows: main entrances to the LLP; Letters in the circle: the location of photos below)

Photos of location a, b and c in the WP

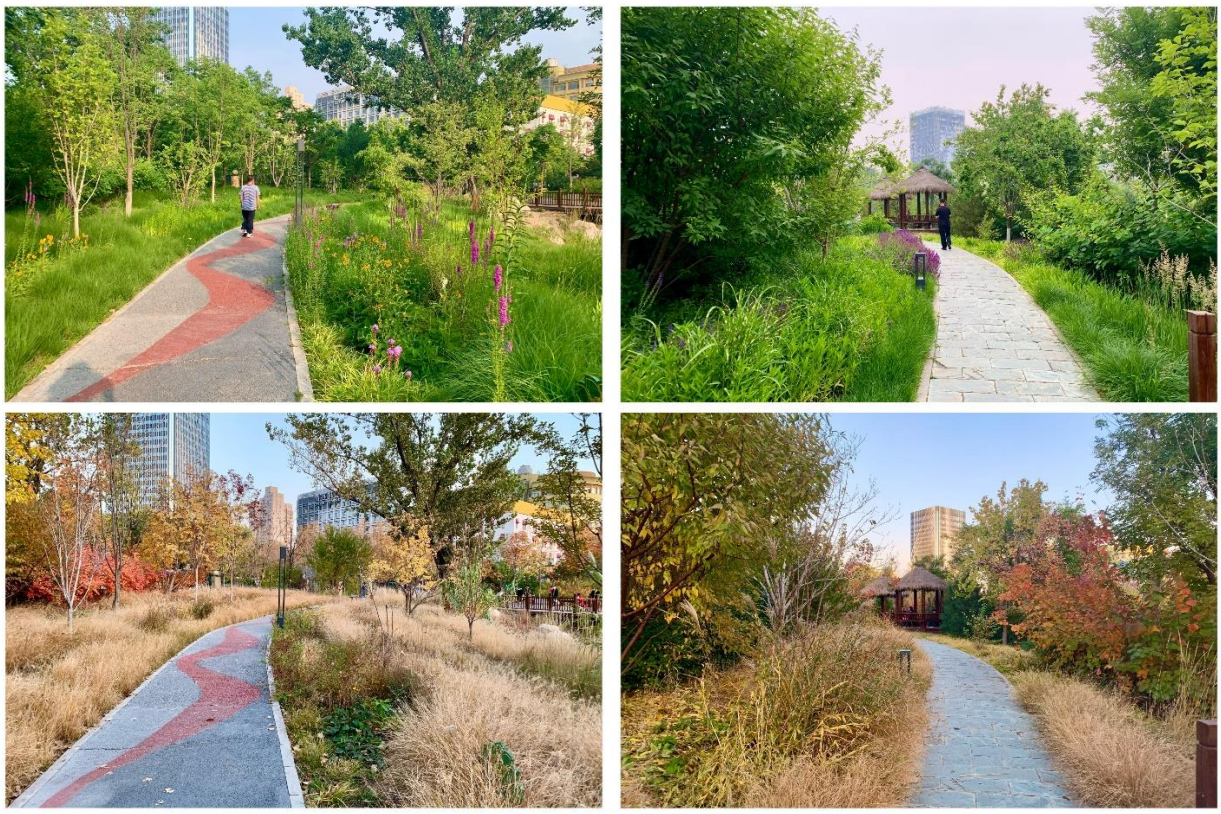
Photos of location d, e and f in the TP

i) Woodland Park (WP)

In 2019, 4.2 hectares of the southern part of the park was re-designed as an 'urban ecological forest'. With the concept of a 'nature-like plant community' and 'Plants eliminate PM2.5 by special planting configuration', woodland and lakes were established to purify the air in the city and increase soil water content through the effective collection of reclaimed water resources in green space. Figure 3.4 shows the summer and autumn scenes in the same locations.

Figure 3.4 Summer and autumn scenes on the same location in the WP

(top two images - summer, bottom two images - autumn)



The two images presented above showcase different locations within the WP. It can be observed that the shrubs on the left images, although relatively more open than those on the right, still maintain a dense disposition (due to the newly-established planting of small trees in 2019, which have yet to reach their fullest growth). Both photographs portray a naturalistic planting characterized by dense, multi-layered, and varying heights, without clear patterns. These images highlight pronounced changes in colour throughout different seasons.

The new planting design of Woodland Park kept the existing mature tall trees on the site; and also used a large number of native tree species (many naturally occurring on the hills around Beijing). The design attempted to increase seasonal interest by using species with attractive flowers in spring and attractive autumn leaf colours, as in natural woodlands. The woodland edges were planted with herbaceous perennials and grasses to provide

colour and interest in summer. Wetland animals such as frogs and fish were introduced to the WP to maximise wildlife biodiversity. The primary plants in the WP are shown below (Table 3.6).

Table 3.6 Main Species used in the WP

Type	Main Species	
Tree layer	*Pinus bungeana*	*Quercus mongolica*
	Amygdalus davidiana	*Cornus macrophylla*
	Styphnolobium japonicum	*Juglans mandshurica*
	Sorbus pohuashanensis	*Chionanthus retusus*
Shrub layer	*Euonymus alatus* 'Compacta'	
	Acer ginnala	
	Symphoricarpos sinensis	
	Weigela florida 'Red Prince'	
	Cotinus coggygria	
Herbaceous	*Hosta plantaginea*	*Rudbeckia fulgida* 'Goldsturm'
	Liriope spicata	*Salvia nemorosa*
	Iris wilsonii	*Acorus calamus*
	Lythrum salicaria	*Arundo donax var. versicolor Stokes*
	Pennisetum alopecuroides 'Little Bunny'	

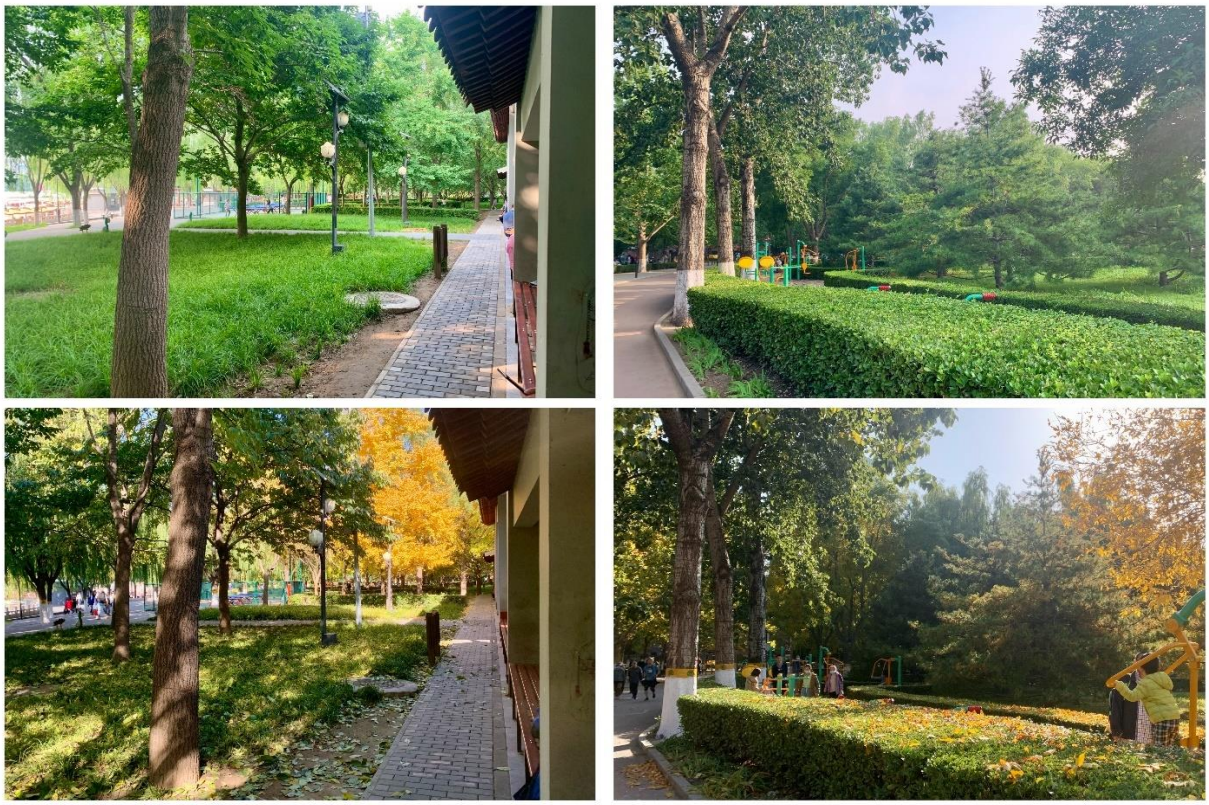
ii) Traditional Park (TP)

This area was selected as a comparative area to the woodland park (WP). Traditional Park (TP) has similar size to WP (white translucent areas in Figure 3.3) and it contains a large area of mown grass, some hedges and widely spaced parkland trees, plus corridors for resting and activity fields like basketball courts, table tennis tables, fitness equipment, etc. TP was constructed around the year 2000, hence the overall planting reflects Chinese conventional plantings (Figure 3.5).

Significantly different from the newly-established WP, the vegetation structure of the TP is simpler with lower plant diversity per unit area and reduced seasonal change: there are two layers of plants mown grass-low ground cover and a layer of widely spaced shrubs and trees. Many mature trees can be found in TP as they were planted for over decades. These trees have considerable height, expansive canopies, and strong, robust root systems. The primary plants in the TP are shown below (Table 3.7).

Figure 3.5 Summer and autumn scenes in the same location in the TP

(top two images - summer, bottom two images - autumn)



The two images presented showcase different locations within the TP. The image on the left depicts an open green space with neatly arranged trees and well-maintained lawns. On the right, neatly pruned shrubs are displayed at the edge of the lawn. Due to the relatively uniform species composition in the TP, distinct changes in colour throughout different seasons are not prominently exhibited.

Table 3.7 Main plants used in the TP and rest areas in the LLP (excluding the WP)

Type	Main Species	
Tree layer	*Pinus tabuliformis*	*Cedrus deodara*
	Pinus bungeana	*Syringa oblata*
	Amygdalus davidiana	*Juniperus chinensis*
	Prunus cerasifera	*Ginkgo biloba*
	Styphnolobium japonicum	*Tilia mongolica*
Shrub layer	*Rosa chinensis*	
	Sambucus williamsii	
	Acer palmatum	
	Berberis thunbergii var. *atropurpurea*	
	Euonymus japonicus	
	Ligustrum x *vicaryi*	
	Eriobotrya deflexa	
Herbaceous	*Hosta plantaginea*	*Heliopsis helianthoides*
	Hydrangea macrophylla	*Alcea rosea*
	Liatris spicata	*Liriope spicata*
	Platycodon grandiflorus	*Cotoneaster multiflorus*

3.1.3. Research Site 3: Expo 2019 Beijing (EXPO)

Expo 2019 Beijing was a Category A1 International Horticultural Exhibition held in Yanqing District, Beijing, China, from April 29 to October 7, 2019. It covered approximately a total area of 503 hectares. It mainly consisted of 41 outdoor international designed gardens and 18 international showrooms in the International Pavilion, 34 Chinese provincial gardens, 3 specialised gardens, as well as 5 Master Designer gardens, etc. Over 9 million national and international visitors were attracted to the Expo during the 6-month exhibition (*Beijing Expo 2019 - Official Site*, 2019). With 'Live Green, Live Better' as the theme and 'Integrating Horticulture into Nature and Touching Souls with Nature' as the philosophy, various types of landscape were designed in alignment with the concept, including the 'New Silk Road' Garden from the Master Designer gardens, and Beijing Garden from the Chinese provincial gardens.

The site of Beijing Expo 2019 is located in the northwest of Beijing, about 74 kilometres away from the urban centre. During the opening of the Expo, several public transportation lines from the city centre were opened to ensure passenger flow. Tickets were priced at 120 CNY (About 13.3 GBP), and date-specific adult pricing for special holidays or ceremony dates was set at 160 CNY (About 17.8 GBP). There was a one-third discount for children, students, and disabled people. The site provided an opportunity to evaluate visitor responses to highly designed, 'high quality' planting but with very different design character in terms of 'naturalness'.

i) 'New Silk Road' Garden (NSR)

The 'New Silk Road' Garden (NSR) was one of the five permanent gardens designed by invited 'Master Designers' (*Beijing Expo 2019 - Official Site*, 2019). The 'New Silk Road' garden covered an area of about 1500 m^2 and was based on the Belt and Road Initiative proposed by China, it uses plants planted along the Silk Road landscape belt to construct a garden journey from Beijing to the West. According to Hitchmough and Stuart-Smith (2019), the overall layout of the garden is a designed woodland surrounding a steppe-like grassland. It was designed to contrast with intensively managed and irrigated exhibition gardens and present the ecological concepts of urban forest, water-saving landscape, and sponge city (urban water management). The open space in the centre of the garden draws on the concept of grassland distributed along the entire Silk Road to create nature-like dry meadow grassland vegetation (Figure 3.6). The selection of plants is a combination of native and non-native species that initially come from China, Middle Asia, Turkey, Eastern Europe, and North America, including *Pennisetum alopecuroides, Muhlenbergia capillaris, Scutellaria baicalensis, Stachys lanata, Patrinia scabiosaefolia*, etc (Table 3.8). These plants are well adapted to Beijing's natural environment and do not require regular irrigation to persist.

Figure 3.6 Summer and autumn scenes in the same location in the NSR garden

(top two images - summer, bottom two images - autumn)

The image on the left above showcases the design of an expansive steppe-like grassland within the NSR, while the image on the right presents a woodland design. In the left image, apart from the neatly pruned boxwood in spherical form, other herbaceous plants are left untrimmed and arranged in a disorderly manner without apparent patterns. This intentional irregular arrangement allows the vegetation community to evolve naturally and sustainably within the design. Consequently, the planting density is not particularly dense, and upon closer inspection, gaps between plants and exposed ground with mulch can be observed. In the woodland setting on the right, apart from the grey wall structure, the other areas remain largely untrimmed. Moreover, the diverse plant species incorporated into the design contribute to distinct seasonal and colour changes.

Table 3.8 Main Species used in tree, shrub and herbaceous layers in the NSR garden

Type	Main Species	
Tree layer	*Tilia cordata*	
	Cornus officinalis	
Shrub layer	*Buxus sinica*	
	Aster divaricatus	
Herbaceous	*Pennisetum alopecuroides*	*Hylotelephium spectabile*
	Muhlenbergia capillaris	*Allium giganteum*
	Scutellaria baicalensis	*Salvia nemorosa*
	Stachys lanata	*Eryngium planum*
	Patrinia scabiosaefolia	*Carex breviculmis*
	Platycodon grandiflorus	*Phlox divaricata*
	Rudbeckia fulgida 'Goldsturm'	*Echinacea pallida*
	Symphyotrichum oblongifolius	

ii) Beijing Garden (BG)

As a comparative garden to the NSR garden, Beijing Garden (BG) is based on the traditional Beijing courtyard and covers an area of 5350 m^2. BG presents elements of the landscape in Beijing with topography-building, water management, vegetation-establishing and landscaping. In the selection of vegetation, BG Garden applies varieties of plants that are common in daily life in Beijing, i.e., *Styphnolobium japonicum, Ginkgo biloba, Pinus tabulaeformis, Yulania denudate, Amygdalus persica, Rosa chinensis, Chrysanthemum* × *morifolium Ramat, Paeonia suffruticosa, Paeonia lactiflora, Allium senescens, Corydalis speciosa* Maxim and *Lythrum salicaria* (Table 3.9).

The research area in the BG covered approximately 1500 m^2, adjacent to a pond in the middle of the BG garden called Flower Shadows on the Green Peak (Figure 3.7). The whole research area has a slope with a 3-meter height difference. The planting of this area was designed with the conventional planting design in China: annual and perennial ornamental plants with bright colours were planted in patterns for a pleasing celebration atmosphere, decorated with rocks and a pavilion and surrounded by the different shapes of trees. It was continuously watered and plants replaced as soon as flowering stopped, it was very intensively managed.

This research area was chosen because it has a similar layout to the NSR, in which trees surround herbaceous planting (although much more widely spaced); with a resting area nearby, but it is very different in the appearance of the planting and the underpinning ideas about what the garden represents.

Figure 3.7 Summer and autumn scenes of research area in the same location in the BG

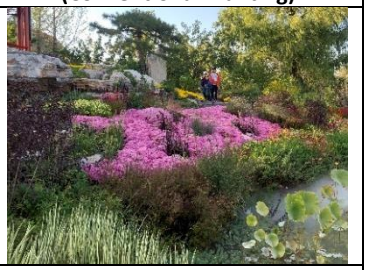
(top two images - summer, bottom two images - autumn)

The image on the left provides an overview of the research area in BG, while the close-up image on the right highlights planting details. Due to the Beijing Garden's popularity as one of the most prominent attractions within the entire horticultural exposition, certain plants are selectively replaced based on growth conditions, thematic considerations, or other reasons to ensure optimal visual impact and well maintenance. For instance, in July, a significant proportion of red plants have been replaced with pink ones for October. Notably, the plants are arranged in clusters and groups, forming distinct patterns, and exhibiting a contrast in colours. Compared to the naturalistic planting in NSR, BG displays fewer planting layers, contributing to a more open overall appearance.

Table 3.9 Main Species used in tree, shrub and herbaceous layers in the whole Beijing Garden

Type	Main Species	
Tree layer	*Pinus tabuliformis*	
	Pinus bungeana	
	Amygdalus davidiana	
	Prunus cerasifera	
	Styphnolobium japonicum	
Shrub layer	*Rosa chinensis*	
	Berberis thunbergii var. *atropurpurea Chenault*	
Herbaceous	*Petunia hybrida*	*Tagetes patula*
	Gaura lindheimeri	*Corydalis speciosa* Maxim
	Lythrum salicaria	*Matteuccia struthiopteris*
	Salvia japonica	*Clematis florida*
	Kniphofia uvaria	*Allium senescens*
	Catharanthus roseus	*Scabiosa comosa*
	Coreopsis basalis	*Hemerocallis fulva*
	Leucanthemum maximum	

Table 3.10 Summary of the research sites in relation to the viewshed diversity, plant species diversity per square metre, evaluation of providing wildlife habitat types and the percentage of coloured 'green' space in summer and autumn

	Baihua Mountain (Natural Environment)	Lotus Lake Park (Urban Park)		EXPO Beijing (Show Garden)	
		Woodland Park (Naturalistic Planting)	Traditional Park (Conventional Planting)	New Silk Road (Naturalistic Planting)	Beijing Garden (Conventional Planting)
					
Viewshed diversity [a]	Very High (500 – 1100 spp.)	Medium (50- max75 spp.)	Low (5-50 spp.)	High (max 120 spp.)	Medium (50-75 spp.)
Plant species diversity per m^2 [b]	Very High (5-50 spp.)	Medium (3-5 spp.)	Low (1-3 spp.)	High (5-15 spp.)	Medium (3-5 spp.)
Providing wildlife habitat types	Very High	High	Low	High	Medium
The % of coloured 'green' space in summer [c]	Medium (5%-20%)	Medium (5%-20%)	Low (0%-5%)	High (20%-50%)	Very High (50%-80%)
The % of coloured 'green' space in autumn [c]	Very High (50%-80%)	Very High (50%-80%)	Medium (5%-20%)	Very High (50%-80%)	Very High (50%-80%)

[a] Estimated the number of potential number of different species in the photo.
[b] the potential values of BM in square metres is the biggest pool of species that could be presented in this landscape compared to the designed landscapes. One of the ecological characteristics of the designed landscapes is the pool of species which can be presented as limited by how many species are planted in the first place.
[c] refers to areas with vegetation or plant cover that are not traditionally green in colour. It contains plants with non-green flowers, foliage, barks, seasonal changes and so on. For the process of calculation, please see Figure 3.8 below.

For more images of each site, please see Appendix 5-9.

Figure 3.8 Coloured 'green' space calculation

Using the autumnal Beijing Garden in EXPO as a case study, this research concentrates on marked research zones outlined by white dashed lines. The visually 'green' spaces within these marked areas were deliberately desaturated and faded. Then, an estimation was made to gauge the portion of coloured sections exclusively within these research-designated spaces. The rest of the site underwent the same calculation approach by the researcher.

As shown in Table 3.10, each research site possesses distinctive characteristics about species diversity, wildlife habitat support, and the coverage of coloured 'green' space across different seasons (For the process of calculation, please see Figure 3.8). Broadly, the Baihua Mountain (BM) site showcases the most natural environment, characterized by diverse vegetation communities and pronounced seasonal variations. The show gardens in EXPO exhibit a higher coverage of coloured vegetation and boast a richer species composition compared to the urban park. This is attributed to the show gardens being primarily designed for ornamental and conceptual exhibitions, leading to high visual impact and species diversity. Furthermore, the naturalistic planting areas exhibit more diverse vegetation communities and provide greater support for wildlife habitats in comparison to areas with conventional planting designs.

3.2. Quantitative survey

Attitudes to the five types of greenspaces, Baihua Mountain (BM), Woodland Park (WP), Traditional Park (TP), 'New Silk Road' Garden (NSR) and Beijing Garden (BG) were assessed via a quantitative questionnaire at two points in time (summer and autumn). A self-reported questionnaire was adopted to obtain the individual evaluation, and it was conducted on-site as the experimental stimuli to get attitudinal statements about the real scene.

3.2.1. Questionnaire design

The design of the questionnaires was rooted in a series of inquiries aimed at understanding participants' perceptions, experiences, and attitudes in relation to the broader concept of 'nature', as well as specific plantings within their immediate environment, encompassing both naturalistic and conventional plantings. These questions were thoughtfully structured to facilitate coherent and fluent responses from the participants, and it encompassed three main sections: an exploration of general experiences and attitudes towards nature, detailed assessments of the on-site plantings, and the collection of participants' personal information and recruitment for interviews (refer to Table 3.11 details).

Table 3.11 General questionnaire structure: the main themes and detailed questions

Theme	Questions
1. General experience and attitude to nature	NR-6/ Picture selection / Interest in nature/type of natural area/frequency / Reason for visiting nature / Children experience / Preferred planting pattern / Important to have plants and wildlife / More species more valuable / Woodland can help reduce CO_2 / Create woodland in city / Climate change / Environment v. Economic
2. Detailed attitudes regarding the planting on site	Familiarity / unsafe feeling / concern as cannot see through / fits well with policies / happy to see more / peaceful and relaxed / cost less / more wildlife in planting / Natural/colourful / messier / denser / more complex / less cared for / exquisite/attractive / estimate how much wildlife can be supported / things like the most / things like the least / overall score
3. Participant information	Gender/age/education/employment status/income/occupation or study/religion/place that you grew up/place that you living
4. Interviewee recruitment	(Optional and voluntary)

For the comparative study conducted within the same location, the questionnaire framework remained consistent. However, for surveys carried out in different locations, such as BM, LLP, and EXPO, certain questions were allowed to be added or omitted based on site-specific characteristics and survey complexities. For instance, the questionnaire conducted in the BM nature reserve included expanded questions about concerns related to real nature, providing more detailed insights compared to surveys conducted in urban parks in LLP and show gardens in EXPO. Inevitably, the questionnaires for BM and LLP were streamlined due to the challenges posed by the Covid-19 pandemic. To minimize participants' contact time, some open-ended questions were removed (For more details, please see Appendix 3).

The majority of questions within the questionnaire employed an attitudinal format, utilizing a five-point Likert scale ranging from 'strongly agree (scored 5)' to 'strongly disagree (scored 1)'. In some instances, a four-point

Likert scale was utilized, spanning from 'most important (scored 4)' to 'least important (scored 1)'. Furthermore, picture selection questions enabled participants to choose one or multiple images. The questionnaire also featured open-ended questions, encouraging participants to provide comments within designated spaces. Notably, open-ended questions were solely included in the EXPO survey before the onset of the Covid-19 pandemic.

To ensure accurate translation, the questionnaires were translated by the author using a translation-back translation procedure (Van der Vijver and Leung, 1997). Both the English and Chinese versions of the questionnaires are provided in Appendix 1 and 2. All the drafts of the questionnaires were approved through the Ethics Review by the Department of Landscape at the University of Sheffield.

Table 3.12, presented below, furnishes detailed descriptions and elucidations of the variables incorporated in the tables, along with the scales and criteria employed for grouping to evaluate responses in the next result chapter. This encompasses classifications such as age groups and income groups.

Table 3.12 Description and explanation of variables used in subsequent chapters

Variables	Explanation of variable and scales used to assess response
Season variables	
Season	Time of year (Summer/autumn).
Background variables	
Frequency of visiting nature	How often was the site visited? (provided options: Every 2 weeks or less / Every month / Every half year / Every year / Every 5 years or more).
Childhood experience	The statement that 'I had many chances to experience nature in my childhood'. (provided options: Agree / Neither agree nor disagree/ Disagree).
Tree species diversity	The proposition was made that the more tree species in woodland, the more valuable it is as a wildlife habitat. (provided options: Agree / Neither agree nor disagree/ Disagree).
Possible to create real woodland	The belief is that it is possible to design and create something approximating real woodland in the city. (provided options: Agree / Neither agree nor disagree/ Disagree).
Demographic variables	
Age groups	In cases where the sample size was insufficient for analysis, the initial division of participants into six age groups was consolidated into three broader adulthood categories: young (18-39), middle (40-59), and late adulthood (above 60). It's worth noting that until 2023, the Chinese statutory retirement age stood at 60 for males and 55 for females.
Income groups	Citing the Survey Office of the National Bureau of Statistics in Beijing (2022), the per capita disposable income of Beijing residents after tax in 2021 was reported as 75,002 CNY per year. This indicates an average monthly income of approximately 7,000 CNY before tax. Utilizing this criterion, the income groups were categorized as follows: 'students', 'low income' (less than 4,000), 'middle income' (4,000-8,000), 'upper middle income' (8,000-16,000), and 'high income' (above 16,000).
Childhood/adult Living experience	Describing childhood and current adult living locations, the data were recoded as follows: 'grew up in the city and currently living in the city', 'grew up in the village and currently living in the village' and 'grew up in the village and currently living in the city'.

3.2.2. Sampling strategy and questionnaire survey procedure

To assess the public's comprehension and acceptance of the designed questionnaire, a pilot study involving 25 questionnaires was conducted prior to the Expo survey in June 2019 in China. During the pilot study, the completion time was measured, and brief feedback was gathered to evaluate the clarity and acceptance of the questionnaire's design and the wording of translated questions. Following the pilot study, minor refinements were made to ensure a coherent structure, universally understood wording and an appropriate layout of the questionnaire. Data generated from the pilot study were solely utilized for the enhancement of the questionnaire design and were not included in the final results of the study.

The questionnaire surveys were carried out face-to-face at each site. Participants for the questionnaire survey were randomly selected from visitors at the respective sites. The eligibility criteria stipulated those participants needed to be aged 18 or older and capable of answering all questions on the questionnaire. The survey aimed to achieve diversity in respondents based on visually observable characteristics such as age, gender, and behavioural attributes like walking, resting, and exercising. Regular reviews of those visually observable demographics were conducted to prevent any significant overrepresentation or underrepresentation of particular demographics in the study. However, intervention or control measures were not applied for some socio-demographic characteristics, such as education, occupation, income or religion.

Each potential participant was approached and offered participation in the research. Those who expressed interest were provided with a participant information sheet to review. It was clearly communicated that the entire questionnaire survey would take approximately 10 to 15 minutes, and participants could withdraw from the research at any point. Upon affirmative consent, participants were asked to read and sign a questionnaire consent form before receiving a copy of the questionnaire. The survey point within the questionnaire was positioned along the regular path to ensure participants were familiar with the environment. Before answering the questionnaire, participants were requested to walk through the landscape along a path spanning approximately 25 to 50 meters to acquaint themselves with the surroundings. Throughout the questionnaire survey process, researchers refrained from interrupting participants unless they had inquiries related to comprehension or procedure. Following completion of the questionnaire, participants were thanked for their time and contribution. Except for the Expo survey, participants in the BM and LLP surveys were also provided with a pack of tissues valued at 0.5 CNY (About 0.03 GBP) as thank-you gifts, in accordance with the amendment made in the Ethics Review during the pandemic.

The initial sample for the questionnaire comprised 1600 participants, including 200 surveyed at Baihua Mountain Nature Reserve, 600 at Lotus Lake Park, and 800 at EXPO 2019 Beijing. The distribution of the sample size across different sites, seasons, and survey times is presented in Table 3.13.

Table 3.13 Summary of sample size and survey time for each site

Location	Baihua Mountain (BM)	Beijing Lotus Lake Park (LLP)		Expo 2019 (Expo)	
Site		Woodland Park	Traditional Park	New Silk Road Garden	Beijing Garden
Summer	86	200	100	200	200
Autumn	114	200	100	200	200
	Total **200**	Total **400**	Total **200**	Total **400**	Total **400**
Time	Summer: 28 Aug – 12 Sept, 2021 Autumn: 10 Oct – 23 Oct, 2021	Summer: 27 May – 30 June, 2021 Autumn: 27 Sept – 27 Oct, 2021		Summer: 25 July – 31 July, 2019 Autumn: 01 Oct – 07 Oct, 2019	

3.2.3. Statistical techniques used in the quantitative analysis

All data analyses of the questionnaires were conducted using SPSS (Statistical Package for Social Sciences) version 28. The SPSS software was primarily employed for tasks such as dimensional reduction, mean comparisons between groups, and exploration of relationships among variables, in addition to basic descriptive statistics.

i) Dimensional reduction

Dimensional reduction was undertaken to transform multi-dimensional datasets comprising clusters of attitudinal questions into a more manageable low-dimensional representation that retains meaningful and significant properties of the original data. For this purpose, the research employed Principal Components Analysis (PCA), a method widely acknowledged in the literature (Fodor, 2002; Pallant, 2010; Tabachnick, Fidell and Ullman, 2019).

Principal Components Analysis (PCA)

As a preliminary extraction technique, the PCA test was employed in the result analysis. It aided in refining and condensing items from a plethora of individual scale questions within the questionnaire, leading to the creation of coherent subscales. These subscales were instrumental in exploring the interrelationships among a set of variables.

PCA is used in exploratory data analysis and aims to extract maximum variance from the data set with each component. In the result chapter, as an assessment of the data factorability in the initial phase, the Kaiser-Meyer-Olkin (KMO) value and Bartlett's test of Sphericity for the PCA test were given to confirm the appropriateness. According to Kaiser and Rice (1974), a KMO score above 0.9 is considered marvellous, above

0.8 is meritorious, above 0.7 is middling, above 0.6 is mediocre, above 0.5 is miserable, and values below 0.5 are deemed unacceptable. Similarly, for Bartlett's test of Sphericity, statistical significance should be below 0.05 to be considered suitable (Pallant, 2010).

The pattern matrix is obtained after applying a varimax rotation, providing the factor loadings of each item in descending order. Components are then identified and labelled based on the collective meaning of all items or the higher-loading items within each component. For example, in the context of an individual's interest in nature, component 1 might encompass items like 'calligraphy/literature/poem', 'landscape painting', 'Chinese traditional garden' and 'traditional philosophical thoughts' listed in descending order. As a result, component 1 could be labelled as 'traditional Chinese culture'. In some instances, a component may include negative loadings, suggesting an opposite interpretation of variables with negative loadings.

Following exploratory data analysis, factor scores were generated for subsequent analysis. DiStefano, Zhu and Mîndrilă (2009) discussed standard methods to create factor scores, categorizing them into refined and non-refined methods, along with the benefits and considerations of each approach in data analysis. One popular non-refined method involves summing scores by the factor, totalling raw scores from all items that load on the factor (Comrey, 1973). While sum scores assign equal weight to items, a refined method like regression scores is more suitable for analysis. Regression scores, generated from PCA, are better suited as they involve regression coefficients that weight the data. Consequently, regression scores derived from PCA were applied for subsequent mean comparisons.

ii) Mean comparison

Mean comparison is a statistical technique used to assess the differences between two or more groups of data, such as gender, age, or income groups, based on their mean values. The interpretation of its results determines whether observed differences are statistically significant or merely due to chance.

To select the appropriate statistical methods, a test for the normalization of data distribution was conducted to determine whether non-parametric or parametric tests should be employed. While Kolmogorov-Smirnov and Shapiro-Wilk tests indicated non-normality for all items in the three surveys ($p < 0.05$), it was argued that for larger sample sizes (equal to or greater than 30), the central limit theorem (CLT) phenomenon would lead to the sampling distribution of the sample mean approximating normality as the sample size increases, regardless of the population distribution (Agresti and Finlay, 1997). Consequently, parametric statistical tests were adopted in this research, employing two techniques: independent sample t-test and one-way between-groups analysis of variance (ANOVA).

Independent sample t-test

This test examines differences between two independent groups, such as male and female participants or outcomes observed in summer and autumn. Unlike non-parametric methods like the Mann-Whitney U test that compares medians, the independent sample t-test compares means. Effect size is quantified using Cohen's d, provided in SPSS 28 and commonly reported in statistical analysis. Cohen's d represents the difference between groups in terms of standard deviation units. For uniformity, Cohen's d was subsequently converted into partial eta-squared (η_p^2), a measure that indicates the percentage of explained variance, in the subsequent chapters presenting the results.

One-way between-groups analysis of variance (ANOVA)

This technique assesses differences among three or more independent groups, like various age groups or occupation categories. Similar to the independent sample t-test, ANOVA allows the comparison of multiple groups. Post hoc comparisons in ANOVA primarily utilized Tukey's test, with the least significant difference (LSD) as an alternative if Tukey's test results were unavailable. According to Pallant (2010), partial eta-squared (η_p^2), akin to Cohen's d, indicates the proportion of variance in the dependent variable attributed to a specific independent variable. Partial eta-squared values of 0.1 to 0.6 are considered small, 0.6 to 0.138 are considered medium, and values exceeding 0.138 are considered large (Cohen, 1988).

iii) Relationship Exploration

Relationship exploration among variables involves assessing the degree of association between two quantitative variables. A comprehensive range of statistical methods was employed in this research to derive meaningful insights from the data.

Chi-squared test for association

This method was utilized to investigate the relationships between multiple categorical variables. It involves comparing observed frequencies with expected frequencies derived from the data. A null result indicates no significant association between the variables. The chi-squared test can also be applied to ordinal variables by treating each ordinal option as a categorical variable. In cases where $\leqslant$ 20% of expected cell counts are less

than 5, the chi-squared test is used; if > 20% of expected cell counts are less than 5, Fisher's exact test is employed.

Pearson product-moment correlation and Spearman Rank Order Correlation

Both techniques serve to ascertain the strength and direction of association between two variables, yielding values that range from -1 (perfect negative correlation) to 1 (perfect positive correlation). The Pearson product-moment correlation is suitable for continuous data, such as the correlation between participants' NR-6 scores and perceived unsafety of planting scores. In contrast, the Spearman Rank Order Correlation is a non-parametric alternative that is employed for ordinal data, such as the correlation between frequency of visiting natural areas (e.g., less than 2 weeks/every month) and perceptions of unsafety (e.g., agree/disagree). The choice of method depends on the type of data and is reported accordingly in the results. The strength of correlation (r) is interpreted as follows: -0.3 to 0.3 indicates a small correlation, -0.5 to -0.3 or 0.3 to 0.5 indicates a medium correlation, -0.9 to -0.5 or 0.5 to 0.9 indicates a large correlation and -1.0 to -0.9 or 0.9 to 1.0 indicates a very large correlation (Cohen, 1988).

3.3. Qualitative survey

Expanding upon the questionnaire survey, a set of open-ended questions was formulated for the interview survey to delve deeper into the underlying reasons and intricacies of the findings. The interview survey encompassed follow-up interviews for each research site as well as interviews with stakeholders from the Beijing Municipal Bureau of Parks and Forestry.

3.3.1. Interview design

Initially, the research planned to conduct site-based questionnaires in a randomized manner as the first stage. Subsequently, in the second stage, online or on-site interviews were intended to be conducted with the same participants who had completed the questionnaires and expressed willingness to participate in the subsequent interview phase. However, due to the impact of the COVID-19 pandemic, only a limited number of participants were able to complete both surveys. As a result, random on-site interviews were also incorporated into the research methodology.

Follow-up interview

In terms of follow-up interviews for the BM (Table 3.14), the LLP (Table 3.15) and the Expo (Table 3.16), the interview's themes were separated into several parts and asked progressively. General questions about the site and participants themselves were usually brought up as a conversation starter, which usually comprised questions about the frequency and reason for visiting greenspace in their daily life, childhood experience in nature, and overall impression of the site.

Subsequently, the themes in relation to the planting styles were addressed by asking more detailed questions on plantings' pattern, structure, similarities, differences, strengths, weaknesses, application scenarios etc. Through analysis of the questionnaire, it was found that the factors of 'restorativeness and attractiveness' and 'disorder and complexity' about planting significantly impacted participants' attitudes. Thus, the questions related to these factors were emphatically put forward in the interview survey. In order to achieve a precise and further understanding, interviewees were asked to define the specific word on attitudinal expression in their own words, e.g., 'messiness', 'rich layers' or 'exquisite'.

Delving into participants' reflections on nature and urban nature further enriched the understanding and elucidation of their previous perceptions of plantings and their broader attitudes toward the overall context. As a result, interviewees were prompted to share their perspectives on nature, urban settings, urban naturalness, seasonal changes in nature, future plans for urban greening, and more.

The interview survey did not rigidly adhere to the sequence outlined in the interview question sheet, as flexibility was maintained to accommodate the diverse and dynamic nature of the conversations. Emergent themes were allowed to organically arise during the discussions.

Table 3.14 the main themes and detailed questions of the BM interviews

Theme	Potential interview questions
General question	The most or least like in BM/ frequency and reason of visiting the BM / why not visiting urban parks instead / unique experience or views in the BM/ improvement of the BM
Planting	Attitude to the placement of vegetation/ diversity and density of vegetation
Personal feeling	Attitude to the path/ wants to see from outside of woodland or get inside of it / feel excited or curious about getting inside of woodland/unsafety/nature connection
Personal experience	Childhood experience
Establishment of urban woodland	The environment around the living place or working place/ feel of nature in the city/ whether the BM vegetation is suitable for urban landscape/value or benefit to establishing woodland in the city/ reason why woodland cannot be built in the city/ obstacle or barrier to establishing urban woodland/how to make urban woodland fit better with the urban context
Attitude to nature	Participants' definition and description of 'nature' / relationship between human-being and nature / natural season change
Personal info	(Only for onsite interview)

Table 3.15 the main themes and detailed questions of the LLP interviews

Theme	Potential interview questions
General question	Familiarity with the plantings/ the most or least like about the planting /improvement of the planting design
Planting	Preference of random or organized placement of planting/ type of underplanting/boundary of path/ feeling about without trimming herbaceous planting/ the diversity of trees/ what features make participants think boring or attractive about planting/ wants to see a more wild or less human-intervened landscape in the urban park
Related to path	Plants too close to the path/ the clear or vague edge of plants along the path / paths too narrow/ more shade over the paths
Related to feeling and connection	Nature connection/ place connection/ unsafety /concerns
Explanation on questionnaire (Online only)	What features made participants feel natural/colourful/attractive/dense/complex/messy… on the questionnaire/definition of some words like 'messy', 'tidy', 'rich layers', 'rough design' …
Thoughts about woodland in cities	What kind of landscape wants to be built with more/ value or benefit to establishing woodland in the city/ how does location affect the application of planting design
Attitude to nature	Participants' definition and description of 'nature' / relationship between human-being and nature / natural season change
Personal info	(Only for onsite interview)

Table 3.16 the main themes and detailed questions of the EXPO interviews

Theme	Potential interview questions
General question	Detail information of natural areas that the participants visited / frequency & type of visiting urban parks or any other green space in cities/ childhood experience
Attitude towards nature	Climate change/ participants' definition and description of 'nature' / relationship between human-being and nature / can the natural environment be created and designed by human beings/ Chinese culture (painting, calligraph, poem, philosophy) impacts participants' views on nature
Naturalistic vs monoculture in designed urban plantings	   Attitude to three pictures above /similarity and difference among three pictures/ the representative of nature / preferred picture that wants to see in daily life / how does location affect the application of planting design
Attitude towards seasonality	  Natural seasons change vs. evergreen planting

Stakeholder's interview

In order to gather information pertinent to the project and solicit policy-relevant insights and decisions, stakeholder interviews were a crucial component of the research. In contrast to the previous follow-up interviews conducted with the general public, stakeholder interviews were geared towards a comprehensive understanding from the perspective of decision-makers. The primary themes and contents of these stakeholder interviews are outlined in Table 3.17.

Table 3.17 the main themes and detailed questions of stakeholders' interviews

Theme	Content
The personal attitude to the project	Personal feelings about the project itself / concerns about planting/attitude to random placement of planting/ attitude to more diverse plantings/comparison between the naturalistic planting and conventional planting/strengths and weaknesses of the naturalistic planting/improvement of the naturalistic planting/attitude to the path design / whether the naturalistic planting fits with Chinese policy in relation to the environment / other colleagues' attitudes
General questions for city park design	How to balance 'immediate high initial impact' with 'achieving highly diverse native plant communities that don't transplant well at a large size' / critical aspects of urban park design/definition of 'ecological/sustainable forest park' / short-term and long-term goals / how does location affect the application of naturalistic planting design/challenges or difficulties
Future plan for the Chinese landscape development	Future landscape development in 5/10/20 years in China

The comprehensive interview question sheet for each research site, as well as the stakeholders' interviews, can be found in Appendix 4.

3.3.2. Sampling strategy and interview survey procedure

To optimize the interview process, three preliminary online pilot interviews were informally conducted in August 2020. These interviews were organized with participants who had shared their contact details and expressed willingness to participate in subsequent online interviews. Feedback from these pilot interviews led to slight adjustments in phrasing and questioning techniques to enhance communication and data collection.

The interviews were conducted through two ways: online interviews and onsite interviews. Initially, the online interview method was conceived to incorporate both general attitudes through questionnaires and in-depth interpretations through subsequent interviews. However, this approach hinged on a significant number of completed questionnaires, a requirement that proved challenging to fulfil due to the unforeseen circumstances arising from the Covid-19 pandemic and associated lockdown measures. Consequently, a separate strategy was adopted, involving random onsite interviews without a preceding questionnaire survey. The overarching of the interviews was to gain participants' personal interpretations of perceptions and preferences for different types

of plantings. This fundamental aspect of the interview process remained consistent across the various approaches.

Before commencing the interviews, participants were briefly introduced to the research, and they were informed about the recording of the interview, its anonymity, and the option to withdraw at any point. Participants were assured of the strict confidentiality of their responses, which would be safeguarded and subsequently destroyed upon conclusion of the research.

For the online interviews, participants who had provided their contact information and expressed willingness to participate in the follow-up interview were individually contacted in the following weeks. Semi-structured online interviews were then scheduled at a convenient date and time for the interviewee. These online interviews typically lasted between 20 to 30 minutes and were conducted using Chinese mobile applications such as WeChat or QQ. Participants were aided in recollection through the sharing of planting-related photographs, followed by a series of open-ended questions aimed at comprehending the array of factors influencing their perceptions and preferences regarding plantings. During the online interview, visual aids such as pictures were introduced only after this specific section to ensure that interviewees' responses were not influenced beforehand.

Conversely, onsite interviews occurred concurrently with the questionnaire survey, conducted at the same location. This approach facilitated greater participation by allowing respondents to choose between completing questionnaires or participating in interview surveys. The onsite interviews benefited from the immersive landscape display, enabling interviewees to experience the planting firsthand and form a holistic perspective rather than relying on memory or imagery. These semi-structured onsite interviews typically spanned 10 to 30 minutes, contingent on the interviewees' willingness to engage.

Over the span of 2020 to 2021, a total of 10 interviews were conducted at Baihua Mountain, 14 at Lotus Lake Park, and 21 online interviews for the EXPO Beijing (Table 3.18). Additionally, two in-depth stakeholder interviews were conducted in 2022, aimed at gaining insights from government officials regarding their perspectives and political awareness concerning natural-like vegetation within urban areas. These stakeholder interviews were conducted within the interviewees' offices and followed procedures akin to those for the public participants. Measures were undertaken to preserve the anonymity of stakeholder participants, and specific details such as names and job positions were omitted from reporting.

Table 3.18 Summary of sample size and survey time for each site of follow-up and stakeholder interviews

Site	**Baihuashan (BM)**		**Lotus Lake Park (LLP)**		**Expo 2019 (Expo)**		**Stakeholder interview**	
Time	28 Aug - 12 Sept, 2021		27 May - 30 June, 2021		09 Sept – 27 Dec 2020			
Sample size	Online	0	Online	5	Online	21	Meeting in person on 20 Jan, 2022	
	Onsite	10	Onsite	9	Onsite	0	Meeting in person on 19 Feb, 2022	
	Total	**10**	**Total**	**14**	**Total**	**21**	**Total**	**2**

3.3.3. Statistical techniques used in the qualitative analysis

The collected interview data were analyzed using NVivo Plus Enterprise 2020 software, employing a content analysis approach to uncover meaningful patterns that illuminated participants' nuanced interpretations of their attitudes towards nature, urban nature, and naturalistic plantings. Content analysis represents a rigorous and structured technique for dissecting textual data with a quantitative perspective (Drisko, 2015).

The initial stage of data analysis encompassed immersing in the Chinese interview transcripts to establish a comprehensive grasp of the content. Subsequently, the interview data underwent systematic coding, whereby segments of text were assigned descriptive codes to capture their essence. For instance, codes such as 'definition of multi-layered', 'appreciation of water', and 'negative aspects of naturalistic planting due to insufficient maintenance' were applied. Through a process of abstraction and synthesis, overarching themes emerged from the established code categories.

In the upcoming results chapter, not only will the important themes, codes, and translated quotations be presented, but also their frequency and corresponding case numbers will be reported. These findings will be contextualized within the framework of preceding qualitative statistical patterns, fostering a deeper comprehension and facilitating further exploration of interviewees' motivations, concerns, beliefs, values, perceptions, and related aspects.

3.4. Summary

This chapter delves into the intricate methodologies adopted to conduct the research and analyse its outcomes. It encompasses the framework utilized for site selection, as well as the design and implementation plan of both quantitative questionnaire surveys and qualitative interview surveys. These methods were chosen to explore the perceptions and preferences of Chinese greenspace users, aiming to uncover the underlying reasons behind their responses to nature, urban nature and naturalistic plantings. The subsequent chapter will then proceed to present the specific data collected from these surveys.

| Chapter 4 : Results

4.1. Introduction and structure of the results

Table 4.1 The structure of the result chapter highlighting the integration of questionnaire and interview results to address research sub-questions and the three main research questions

Research question	Sub-themes	Questionnaire results (quantitative)	Interview results (qualitative)
Question 1: **How do Chinese greenspace users recognise and define 'nature'?**	**Frequency of and Reasons for visiting nature, and preferred types of 'nature'**	▪ Frequency of visiting nature ▪ Reasons for visiting nature ▪ Preferred types of 'nature'	
	Representation and definition of nature	▪ Picture selection of the representation of nature	▪ Definitions and descriptions of nature; ▪ accessibility; ▪ be creatable by human
	Perceptions of vegetation in real nature	▪ Perceptions of vegetation in real nature	
	Concerns about nature	▪ Overall impression score on vegetation in real nature	▪ Descriptions of these perceptions
	Nature relatedness	▪ Concerns about nature	▪ Descriptions of these concerns
	Interests in nature and childhood nature experiences	▪ Nature relatedness scale	▪ Preferred ways of connecting with nature
Question 2: **How do Chinese greenspace users recognise and evaluate 'urban greenspace'?**	**Thoughts on the relationship between the city and nature**		▪ Definition of 'city'; Relationship between the city and nature ▪ Benefits & Difficulties of establishing 'nature' in cities; ▪ Preferred characteristics
	Attitude to urban greenspaces		
	Beliefs and values related to the urban environment	▪ Beliefs and values related to the urban environment	
Question 3: **How do greenspace users perceive naturalistic planting in urban areas?**	**Comparison between NP and CP in urban park scale**	▪ Perceptions of vegetation in urban parks; ▪ Overall impression score	▪ Comparison between NP and CP in urban parks
	Comparison between NP and CP in designed show garden scale	▪ Perceptions of vegetation in show gardens; ▪ Overall impression score; ▪ The most and least favoured aspects of plantings	▪ Comparison between images of real nature, NP and CP
	Comparison between real nature and NP in urban parks and show gardens	▪ Comparison between real nature, NP in urban parks and show gardens	
	Perceived and preferred characteristics of NP	▪ Perceived and preferred characteristics	▪ Description and definition of each characteristic

The results in the chapter aim to offer insights into the definitions of nature, evaluations of urban greenspace, and perceptions and preferences for naturalistic planting among Chinese greenspace users. The data is presented and organized in alignment with the three primary research questions and is integrated with the fourth research question regarding participants' beliefs, values, and socio-demographic factors, as outlined in Table 4.1. The intention behind this approach is to distinctly demonstrate the diverse population structures within each sub-theme, considering the unique characteristics of each research site and the corresponding sample size. Moreover, analysis of the quantitative data revealed statistical patterns and relationships, whereas the qualitative data was used to gain a deeper underlying interpretation of these in terms of human experience and perceptions.

4.2. Participants' socio-demographic characteristics

A total of 1,600 onsite questionnaires were collected during the research period, while 45 interviews were conducted either online or onsite across the three research sites: Baihua Mountain National Nature Reserve (BM), Beijing Lotus Lake Park (LLP) and Beijing Expo 2019 (EXPO) (Table 4.2). The data collection spanned from 2019 to 2021. Additionally, two stakeholder interviews were conducted in-person with 2 decision-makers who worked at the Beijing Municipal Bureau of Parks and Forestry in 2022.

Table 4.2 Summary of data collection

Research Site 1- National Nature Reserve: Baihua Mountain National Nature Reserve (BM)			
Questionnaire	**200**		[Survey time]
Summer	86		**Questionnaire:**
Autumn	114		Summer: 28 Aug – 12 Sept 2021
			Autumn: 10 Oct – 23 Oct 2021
			Interview:
Interview	**10 (all onsite)**		21 Oct – 23 Oct 2021
Research Site 2- Urban Park: Beijing Lotus Lake Park (LLP)			
Questionnaire	**600**		[Survey time]
	Woodland Park (WP)	**Traditional Park (TP)**	**Questionnaire:**
Subdivided by site	400	200	Summer: 27 May– 30 June 2021
Summer	200	100	Autumn:27 Sept– 27 Oct 2021
Autumn	200	100	**Interview:**
Interview	**14 (5 onsite and 9 online)**		30 Aug – 02 Nov 2021
Research Site 3 - Show Gardens: EXPO 2019 Beijing (EXPO)			
Questionnaire	**800**		[Survey time]
	New Silk Road Garden (NSR)	**Beijing Garden (BG)**	**Questionnaire:**
Subdivided by site	400	400	Summer: 25 July – 31 July 2019
Summer	200	200	Autumn: 01 Oct – 07 Oct 2019
Autumn	200	200	**Interview:**
Interview	**21 (all online)**		17 Sept – 27 Dec 2020
2 stakeholder interviews were conducted on 20 Jan 2022 and 19 Feb 2022			

To explore seasonal effects, questionnaire surveys were conducted respectively for each site in the summer and autumn seasons.

The socio-demographic profiles for each site are summarised below in Table 4.3.

The gender distribution across most sites was approximately equal, with a roughly equal number of male and female participants. However, in the TP of the LLP, there were more male participants compared to females.

Regarding age, the EXPO, as a nationwide exhibition far from Beijing city centre, attracted a larger number of young participants. In contrast, participants in LLP represented an older demographic as daily users were mainly elderly. Participants in BM were mainly in middle adulthood (average age: BM: 39.1 years old, LLP: 50.9 years old, EXPO: 31.7 years old. These average ages were calculated based on the mean age of the range of the answers, e.g., the range of answers'50-59', '54.5' was chosen; the range of answers '18-29', '33.5' was chosen).

Over 60% of the total of 1600 participants had attained undergraduate and higher educational qualifications. The EXPO attracted a higher proportion of highly educated participants, whereas LLP had a higher percentage of participants with lower educational qualifications (undergraduate education and above BM: 75.2%, LLP: 42.7%, EXPO: 79.0% of total participants in each site). It is worth noting that this difference may be associated with the age group, as a significant negative correlation was found between age and educational qualifications in this research ($p<0.001$, $r= -0.391$, $n=1600$).

Regarding employment status and income, BM and EXPO mainly had full-time employed participants, with EXPO having more students. LLP featured a blend of full-time employed and retired participants. BM attracted a higher proportion of affluent participants, followed by EXPO (average income: BM: 12,768 CYN, LLP: 8,757 CYN, EXPO: 10,335 CYN, excluding the student group, averaged by the median salary range).

In terms of participants' fields of study and occupation, the 'other' option was the most frequently selected across all three sites, indicating a diverse range of professions and study backgrounds beyond the four disciplines listed in the questionnaire. However, the EXPO, being a horticulture exhibition, attracted a higher number of practitioners and students from biological disciplines and natural environments than the other two sites.

Most participants were not religious yet there was a higher percentage of Buddhist participants at LLP than at other sites. Non-religious participants held a clear majority for all sites. Buddhism participants in the LLP were relatively more than other sites.

The EXPO attracted participants from a wide range of locations, resulting in greater diversity in terms of childhood and current living places compared to the other sites. Participants in BM and LLP were primarily locals or residents of first-tier cities.

In summary, the LLP, as a payment-free city park in Beijing, mainly attracted retired elderly individuals with lower educational qualifications and income, both on working days and weekends. The EXPO, as a national horticultural exhibition, drew a larger number of students and professionals working in natural-related fields. The BM, known as a suburban leisure and exercise destination in Beijing, attracted more middle-aged individuals and higher-income participants.

Table 4.3 Questionnaire participants: Socio-demographic profile (% of total N)

Gender	Overall (N=1600)	BM (N=200)	LLP (N=600)	LLP-WP (N=400)	LLP-TP (N=200)	EXPO (N=800)	EXPO-NSR (N=400)	EXPO-BG (N=400)
Male	829 (51.8%)	97 (48.5%)	313 (52.2%)	191 (47.8%)	122 (61.0%)	419 (52.4%)	191 (47.8%)	228 (57.0%)
Female	771 (48.2%)	103 (51.5%)	287 (47.8%)	209 (52.3%)	78 (39.0%)	381 (47.6%)	209 (52.3%)	172 (43.0%)

Age	Overall (N=1600)	BM (N=200)	LLP (N=600)	LLP-WP (N=400)	LLP-TP (N=200)	EXPO (N=800)	EXPO-NSR (N=400)	EXPO-BG (N=400)
18-29	556 (34.8%)	50 (25.0%)	52 (8.7%)	23 (5.8%)	29 (14.5%)	454 (56.8%)	207 (51.8%)	247 (61.8%)
30-39	313 (19.6%)	60 (30.0%)	102 (17.0%)	54 (13.5%)	48 (24%)	151 (18.9%)	82 (20.5%)	69 (17.3%)
40-49	287 (17.9%)	49 (24.5%)	109 (18.2%)	75 (18.8%)	34 (17.0%)	129 (16.1%)	66 (16.5%)	63 (15.8%)
50-59	223 (13.9%)	27 (13.5%)	142 (23.7%)	102 (25.5%)	40 (20.0%)	54 (6.8%)	36 (9.0%)	18 (4.5%)
60-69	151 (9.4%)	12 (6.0%)	129 (21.5%)	87 (21.8%)	42 (21.0%)	10 (1.3%)	8 (2.0%)	2 (0.5%)
Above 70	70 (4.4%)	2 (1.0%)	66 (11.0%)	59 (14.8%)	7 (3.5%)	2 (0.3%)	1 (0.3%)	1 (0.3%)

Educational Qualification	Overall (N=1600)	BM (N=200)	LLP (N=600)	LLP-WP (N=400)	LLP-TP (N=200)	EXPO (N=800)	EXPO-NSR (N=400)	EXPO-BG (N=400)
High school or below	288 (18.0%)	23 (11.5%)	196 (32.7%)	136 (34.0%)	60 (30.0%)	69 (8.6%)	36 (9.0%)	33 (8.3%)
Junior college or equivalent degree	276 (17.3%)	29 (14.5%)	148 (24.7%)	90 (22.5%)	58 (29.0%)	99 (12.4%)	55 (13.8%)	44 (11.0%)
Undergraduate	727 (45.4%)	187 (31.2%)	187 (31.2%)	121 (30.3%)	66 (33.0%)	452 (56.5%)	221 (55.3%)	231 (57.8%)
Postgraduate and above	309 (19.3%)	88 (44.0%)	69 (11.5%)	53 (13.3%)	16 (8.0%)	180 (22.5%)	88 (22.0%)	92 (23.0%)

Employment status	Overall (N=1600)	BM (N=200)	LLP (N=600)	LLP-WP (N=400)	LLP-TP (N=200)	EXPO (N=800)	EXPO-NSR (N=400)	EXPO-BG (N=400)
Full-time employment	803 (50.2%)	145 (72.5%)	240 (40%)	146 (36.5%)	94 (47.0%)	418 (52.3%)	220 (55.0%)	198 (49.5%)
Part-time employment	36 (2.3%)	2 (1.0%)	16 (2.7%)	11 (2.8%)	5 (2.5%)	18 (2.3%)	14 (3.5%)	4 (1.0%)
Unemployed	19 (1.2%)	0	12 (2.0%)	5 (1.3%)	7 (3.5%)	7 (0.9%)	3 (0.8%)	4 (1.0%)
Self-employed	139 (8.7%)	16 (8.0%)	71 (11.8%)	46 (11.5%)	25 (12.5%)	52 (6.5%)	31 (7.8%)	21 (5.3%)
Homemaker	34 (2.1%)	2 (1.0%)	19 (3.2%)	12 (3.0%)	7 (3.5%)	13 (1.6%)	9 (2.3%)	4 (1.0%)
Student	300 (18.8%)	18 (9.0%)	12 (2.0%)	9 (2.3%)	3 (1.5%)	270 (33.8%)	110 (27.5%)	160 (40.0%)
Retired	269 (16.8%)	17 (8.5%)	230 (38.3%)	171 (42.8%)	59 (29.5%)	22 (2.8%)	13 (3.3%)	9 (2.3%)

Income (CNY, monthly, before tax)	Overall (N=1600)	BM (N=200)	LLP (N=600)	LLP-WP (N=400)	LLP-TP (N=200)	EXPO (N=800)	EXPO-NSR (N=400)	EXPO-BG (N=400))
student	289 (18.1%)	15 (7.5%)	11 (1.8%)	7 (1.8%)	4 (2.0%)	263 (32.9%)	110 (27.5%)	153 (38.3%)
Less than 4,000	197 (12.3%)	19 (9.5%)	109 (18.2%)	70 (17.5%)	39 (19.5%)	69 (8.6%)	43 (10.8%)	26 (6.5%)
4,000 - 8,000	434 (27.1%)	35 (17.5%)	228 (38.0%)	149 (37.3%)	79 (39.5%)	171 (21.4%)	94 (23.5%)	77 (19.3%)
8,000 - 12,000	273 (17.1%)	39 (19.5%)	117 (19.5%)	74 (18.5%)	43 (21.5%)	117 (14.6%)	63 (15.8%)	54 (13.5%)
12,000 - 16,000	155 (9.7%)	27 (13.5%)	53 (8.8%)	39 (9.8%)	14 (7.0%)	75 (9.4%)	41 (10.3%)	34 (8.5%)
16,000 - 20,000	93 (5.8%)	21 (10.5%)	36 (6.0%)	28 (7.0%)	8 (4.0%)	36 (4.5%)	16 (4.0%)	20 (5.0%)
above 20,000	159 (9.9%)	44 (22.0%)	46 (7.7%)	33 (8.3%)	13 (6.5%)	69 (8.6%)	33 (8.3%)	36 (9.0%)

Occupation or study	Overall (N=1600)	BM (N=200)	LLP (N=600)	LLP-WP (N=400)	LLP-TP (N=200)	EXPO (N=800)	EXPO-NSR (N=400)	EXPO-BG (N=400)
Related to biological discipline and natural environment	226 (14.1%)	24 (12.0%)	59 (9.8%)	44 (11.0%)	15 (7.5%)	143 (17.9%)	93 (23.3%)	50 (12.5%)
Related to creative practice and design	118 (7.4%)	15 (7.5%)	32 (5.3%)	18 (4.5%)	14 (7.0%)	71 (8.9%)	38 (9.5%)	33 (8.3%)
Related to engineer and physical science	255 (15.9%)	27 (13.5%)	79 (13.2%)	57 (14.2%)	22 (11.0%)	149 (18.6%)	59 (14.8%)	90 (22.5%)
Related to finance and management	359 (22.4%)	59 (29.5%)	123 (20.5%)	80 (20.0%)	43 (21.5%)	177 (22.1%)	90 (22.5%)	87 (21.8%)
Other	642 (40.1%)	75 (37.5)	307 (51.2%)	201 (50.2%)	106 (53.0%)	260 (32.5%)	120 (30.0%)	140 (35.0%)

Religion	Overall (N=1600)	BM (N=200)	LLP (N=600)	LLP-WP (N=400)	LLP-TP (N=200)	EXPO (N=800)	EXPO-NSR (N=400)	EXPO-BG (N=400)
No religion	1428 (89.3%)	183 (91.5%)	505 (84.2%)	326 (81.5%)	179 (89.5%)	740 (92.5%)	371 (92.8%)	369 (92.3%)
Christian	31 (1.9%)	3 (1.5%)	22 (3.7%)	14 (3.5%)	8 (4.0%)	6 (0.8%)	3 (0.8%)	3 (0.8%)
Buddhist	108 (6.8%)	9 (4.5%)	60 (10%)	51 (12.8%)	9 (4.5%)	39 (4.9%)	16 (4.0%)	23 (5.8%)
Muslim	7 (0.4%)	1 (0.5%)	3 (0.5%)	3 (0.8%)	0	3 (0.4%)	1 (0.3%)	2 (0.5%)
Daoist	11 (0.7%)	1 (0.5%)	6 (1.0%)	4 (1.0%)	2 (1.0%)	4 (0.5%)	1 (0.3%)	3 (0.8%)
Confucianist	15 (0.9%)	3 (1.5%)	4 (0.7%)	2 (0.5%)	2 (1.0%)	8 (1.0%)	8 (2.0%)	0
Other	0	0	0	0	0	0	0	0

Place of childhood spent in	Overall (N=1600)	BM (N=200)	LLP (N=600)	LLP-WP (N=400)	LLP-TP (N=200)	EXPO (N=800)	EXPO-NSR (N=400)	EXPO-BG (N=400)
First-tier city	474 (29.6%)	65 (32.5%)	234 (39.0%)	166 (41.5%)	68 (34.0%)	175 (21.9%)	79 (19.8%)	96 (24.0%)
Second-tier city	164 (10.3%)	16 (8.0%)	59 (9.8%)	36 (9.0%)	23 (11.5%)	89 (11.1%)	54 (13.5%)	35 (8.8%)
Third-tier city	283 (17.7%)	26 (13.0%)	93 (15.5%)	62 (15.5%)	31 (15.5%)	164 (20.5%)	83 (20.8%)	81 (20.3%)
City fringe	132 (8.3%)	21 (10.5%)	36 (6.0%)	19 (4.8%)	17 (8.5%)	75 (9.4%)	36 (9.0%)	39 (9.8%)
Town / Village	538 (33.6%)	72 (36.0%)	175 (29.2%)	116 (29.0%)	59 (29.5%)	291 (36.4%)	146 (36.5%)	145 (36.3%)
Other	9 (0.6%)	0	3 (0.5%)	1 (0.3%)	2 (1.0%)	6 (0.8%)	2 (0.5%)	4 (1.0%)

Current living place	Overall (N=1600)	BM (N=200)	LLP (N=600)	LLP-WP (N=400)	LLP-TP (N=200)	EXPO (N=800)	EXPO-NSR (N=400)	EXPO-BG (N=400)
First-tier city	1179 (73.7%)	160 (80.0%)	525 (87.5%)	368 (92.0%)	157 (78.5%)	494 (61.8%)	236 (59.0%)	258 (64.5%)
Second-tier city	101 (6.3%)	5 (2.5%)	21 (3.5%)	9 (2.3%)	12 (6.0%)	75 (9.4%)	60 (15.0%)	15 (3.8%)
Third-tier city	89 (5.6%)	1 (0.5%)	15 (2.5%)	8 (2.0%)	7 (3.5%)	73 (9.1%)	36 (9.0%)	37 (9.3%)
City fringe	106 (6.6%)	19 (9.5%)	14 (2.3%)	6 (1.5%)	8 (4.0%)	73 (9.1%)	28 (7.0%)	45 (11.3%)
Town / Village	113 (7.1%)	14 (7.0%)	21 (3.5%)	8 (2.0%)	13 (6.5%)	78 (9.8%)	37 (9.3%)	41 (10.3%)
Other	12 (0.8%)	1 (0.5%)	4 (0.7%)	1 (0.3%)	3 (1.5%)	7 (0.9%)	3 (0.8%)	4 (1.0%)

Table 4.4 Detailed Socio-demographic profile of the interviewees in the BM, LLP and EXPO surveys

ID	Survey date	Method	Gender	Age	Education Qualification	Employment	Income	Occupation (related to…)	Religion	Childhood	Living place
BM 01	2021/10/21	Onsite	Male	70+	Undergraduate	Retired	4,000 - 8,000	Other	No	1st-tier city	1st-tier city
BM 02	2021/10/21	Onsite	Male	18-29	Postgraduate and above	Student	Student	Biological discipline and natural environment	No	City fringe	1st-tier city
BM 03	2021/10/21	Onsite	Male	50-59	Undergraduate	Full-time	12,000 - 16,000	Other	No	Town/village	1st-tier city
BM 04	2021/10/21	Onsite	Female	40-49	Postgraduate and above	Full-time	16,000 - 20,000	Other	No	Town/village	Town/village
BM 05	2021/10/22	Onsite	Female	18-29	Postgraduate and above	Full-time	4,000 - 8,000	Other	No	2nd-tier city	1st-tier city
BM 06	2021/10/22	Onsite	Female	40-49	High school or below	Full-time	Less than 4,000	Other	No	Town/village	1st-tier city
BM 07	2021/10/23	Onsite	Female	40-49	Undergraduate	Full-time	12,000 - 16,000	Finance and management	No	1st-tier city	1st-tier city
BM 08	2021/10/23	Onsite	Male	30-39	High school or below	Full-time	above 20,000	Finance and management	No	Town/village	1st-tier city
BM 09	2021/10/23	Onsite	Female	40-49	High school or below	Full-time	Less than 4,000	Other	No	Town/village	1st-tier city
BM 10	2021/10/23	Onsite	Female	18-29	Postgraduate and above	Full-time	16,000 - 20,000	Engineer and physical science	No	Town/village	1st-tier city
LLP 01	2021/8/30	Online	Male	18-29	Undergraduate	Student	Student	Biological discipline and natural environment	No	1st-tier city	1st-tier city
LLP 02	2021/9/7	Online	Male	18-29	Undergraduate	Full-time	4,000 - 8,000	Finance and management	No	1st-tier city	1st-tier city
LLP 03	2021/9/7	Online	Female	30-39	Postgraduate and above	Full-time	8,000 - 12,000	Other	No	2nd-tier city	1st-tier city
LLP 04	2021/9/7	Online	Male	18-29	Postgraduate and above	Student	Student	Creative practice and design	No	Town/village	1st-tier city
LLP 05	2021/9/7	Online	Male	18-29	Postgraduate and above	Student	4,000 - 8,000	Engineer and physical science	No	City fringe	1st-tier city
LLP 06	2021/9/22	Online	Male	40-49	Undergraduate	Self-employed	8,000 - 12,000	Finance and management	No	Town/village	1st-tier city
LLP 07	2021/10/22	Online	Male	60-69	Undergraduate	Retired	4,000 - 8,000	Finance and management	No	City fringe	1st-tier city
LLP 08	2021/10/31	Onsite	Female	30-39	Undergraduate	Full-time	8,000 - 12,000	Other	Bud[a]	Town/village	1st-tier city
LLP 09	2021/10/31	Onsite	Male	30-39	Postgraduate and above	Full-time	8,000 - 12,000	Finance and management	No	3rd-tier city	1st-tier city
LLP 10	2021/10/31	Online	Male	60-69	Undergraduate	Retired	8,000 - 12,000	Other	Dao[b]	2nd-tier city	1st-tier city
LLP 11	2021/11/2	Online	Male	40-49	Undergraduate	Part-time	12,000 - 16,000	Engineer and physical science	Bud	1st-tier city	1st-tier city
LLP 12	2021/10/31	Onsite	Male	60-69	High school or below	Retired	Less than 4,000	Biological discipline and natural environment	No	Town/village	1st-tier city
LLP 13	2021/11/2	Onsite	Male	60-69	Undergraduate	Retired	4,000 - 8,000	Finance and management	No	City fringe	1st-tier city
LLP 14	2021/11/2	Onsite	Male	60-69	Junior college	Retired	4,000 - 8,000	Other	Bud	Town/village	1st-tier city
EXPO 01	2020/9/17	Online	Male	50-59	Postgraduate and above	Full-time	above 20,000	Finance and management	No	Town/village	1st-tier city
EXPO 02	2020/9/21	Online	Female	18-29	Postgraduate and above	Student	Student	Biological discipline and natural environment	No	2nd-tier city	1st-tier city
EXPO 03	2020/9/22	Online	Male	18-29	Postgraduate and above	Student	Student	Biological discipline and natural environment	No	Town/village	1st-tier city
EXPO 04	2020/9/26	Online	Male	18-29	Undergraduate	Student	Student	Creative practice and design	No	Town/village	2nd-tier city
EXPO 05	2020/9/30	Online	Female	18-29	Undergraduate	Student	Student	Biological discipline and natural environment	No	Town/village	2nd-tier city
EXPO 06	2020/10/1	Online	Female	18-29	Postgraduate and above	Full-time	4,000 - 8,000	Biological discipline and natural environment	Bud	Town/village	2nd-tier city
EXPO 07	2020/10/2	Online	Female	18-29	Postgraduate and above	Student	Student	Biological discipline and natural environment	No	Town/village	1st-tier city

EXPO 08	2020/10/5	Online	Male	18-29	Undergraduate	Student	Student	Engineer and physical science	No	Town/village	1st-tier city
EXPO 09	2020/10/17	Online	Female	18-29	Postgraduate and above	Full-time	4,000 - 8,000	Other	No	2nd-tier city	1st-tier city
EXPO 10	2020/10/20	Online	Female	50-59	Undergraduate	Full-time	above 20,000	Engineer and physical science	No	1st-tier city	1st-tier city
EXPO 11	2020/10/21	Online	Male	18-29	Undergraduate	Student	Student	Engineer and physical science	No	3rd-tier city	1st-tier city
EXPO 12	2020/10/22	Online	Male	18-29	Undergraduate	Student	Student	Engineer and physical science	No	Town/village	City fringe
EXPO 13	2020/10/22	Online	Female	18-29	Postgraduate and above	Full-time	8,000 - 12,000	Finance and management	No	Town/village	1st-tier city
EXPO 14	2020/10/25	Online	Male	18-29	Undergraduate	Full-time	12,000 - 16,000	Engineer and physical science	No	2nd-tier city	1st-tier city
EXPO 15	2020/10/25	Online	Male	18-29	Undergraduate	Student	Student	Engineer and physical science	No	Town/village	2nd-tier city
EXPO 16	2020/10/26	Online	Female	18-29	Postgraduate and above	Full-time	8,000 - 12,000	Biological discipline and natural environment	No	Town/village	1st-tier city
EXPO 17	2020/10/31	Online	Male	30-39	Postgraduate and above	Full-time	8,000 - 12,000	Engineer and physical science	No	2nd-tier city	1st-tier city
EXPO 18	2020/11/1	Online	Female	18-29	Postgraduate and above	Student	Student	Biological discipline and natural environment	No	2nd-tier city	1st-tier city
EXPO 19	2020/11/21	Online	Female	18-29	Postgraduate and above	Self-employed	16,000 - 20,000	Creative practice and design	Bud	3rd-tier city	1st-tier city
EXPO 20	2020/11/28	Online	Male	18-29	Undergraduate	Student	Student	Engineer and physical science	No	1st-tier city	1st-tier city
EXPO 21	2020/12/27	Online	Female	40-49	Undergraduate	Full-time	12,000 - 16,000	Biological discipline and natural environment	No	Town/village	1st-tier city

[a] Bud = Buddhism

[b] Dao = Daoism

Table 4.5 Interview participants: Socio-demographic profile (% of total N)

Gender	Overall (N=45)	BM (N=10)	LLP (N=14)	EXPO (N=21)
Male	26 (57.8%)	4	12	10
Female	19 (42.2%)	6	2	11

Age	Overall (N=45)	BM (N=10)	LLP (N=14)	EXPO (N=21)
18-29	24 (53.3%)	3	4	17
30-39	5 (11.1%)	1	3	1
40-49	7 (15.6%)	4	2	1
50-59	3 (6.7%)	1	0	2
60-69	5 (11.1%)	0	5	0
Above 70	1 (2.2%)	1	0	0

Educational Qualification	Overall (N=45)	BM (N=10)	LLP (N=14)	EXPO (N=21)
High school or below	4 (8.9%)	3	1	0
Junior college or equivalent degree	1 (2.2%)	0	1	0
Undergraduate	21 (26.6%)	3	8	10
Postgraduate and above	19 (42.2%)	4	4	11

Employment status	Overall (N=45)	BM (N=10)	LLP (N=14)	EXPO (N=21)
Full-time employment	21 (26.6%)	8	4	9
Part-time employment	1 (2.2%)	0	1	0
Unemployed	0	0	0	0
Self-employed	2 (4.4%)	0	1	1
Homemaker	0	0	0	0
Student	15 (33.3%)	1	3	11
Retired	6 (13.3%)	1	5	0

Income (CNY, monthly, before tax)	Overall (N=45)	BM (N=10)	LLP (N=14)	EXPO (N=21)
student	14 (31.1%)	1	2	11
Less than 4,000	3 (6.7%)	2	1	0
4,000 - 8,000	9 (20.0%)	2	5	2
8,000 - 12,000	8 (17.8%)	0	5	3
12,000 - 16,000	5 (11.1%)	2	1	2
16,000 - 20,000	3 (6.7%)	2	0	1
above 20,000	3 (6.7%)	1	0	2

Occupation or study	Overall (N=45)	BM (N=10)	LLP (N=14)	EXPO (N=21)
Related to biological discipline and natural environment	11 (24.4%)	1	2	8
Related to creative practice and design	3 (6.7%)	0	1	2
Related to engineer and physical science	11 (24.4%)	1	2	8
Related to finance and management	9 (20.0%)	2	5	2
Other	11 (24.4%)	6	4	1

Religion	Overall (N=45)	BM (N=10)	LLP (N=14)	EXPO (N=21)
No religion	39 (86.6%)	10	10	19
Christian	1 (2.2%)	0	1	0
Buddhist	4 (8.9%)	0	2	2
Muslim	0	0	0	0
Daoist	1 (2.2%)	0	1	0
Confucianist	0	0	0	0
Other	0	0	0	0

Place of childhood spent in	Overall (N=45)	BM (N=10)	LLP (N=14)	EXPO (N=21)
First-tier city	10 (22.2%)	2	6	2
Second-tier city	8 (17.8%)	1	2	5
Third-tier city	3 (6.7%)	0	1	2
City fringe	3 (6.7%)	1	2	0
Town / Village	21 (46.7%)	6	3	12
Other	0	0	0	0

Current living place	Overall (N=45)	BM (N=10)	LLP (N=14)	EXPO (N=21)
First-tier city	39 (86.7%)	9	14	16
Second-tier city	4 (8.9%)	0	0	4
Third-tier city	0	0	0	0
City fringe	1 (2.2%)	0	0	1
Town / Village	1 (2.2%)	1	0	0
Other	0	0	0	0

Both an overview (Table 4.5) and further details (Table 4.4) of the interviewees' socio-demographic characteristics are shown above. Due to the COVID-19 pandemic, the EXPO interviews were conducted entirely online to ensure safety. On the other hand, the BM interviews were conducted onsite to capture participants' intuitive feelings while experiencing nature. For the LLP interviews, half of the interviewees were chosen randomly onsite, while the rest were contacted using the information they provided during the questionnaire survey due to changes in COVID policy.

Overall, the 45 interviews exhibited a relatively balanced gender distribution, except for LLP, which had only two female interviewees. The majority of interviewees fell into the age range of 18 to 29. Furthermore, a significant proportion of the interviewees had undergraduate and above educational qualifications. Most of the interviewees were either full-time employed or students, with middle incomes. Among the various occupation options, with the exception of a few design-related occupations, the remaining four categories were represented in approximately equal proportions among the interviewees. Similar to the questionnaire, the overwhelming majority of interviewees had no religion. Around half of the interviewees grew up in the town, village or city fringe. By the end of the survey period, the majority of the interviewees were currently living in the 1st- tier city, which can therefore be assumed that they were all Beijing residents.

4.3. Research Question 1: How do Chinese greenspace users recognise and define 'nature'?

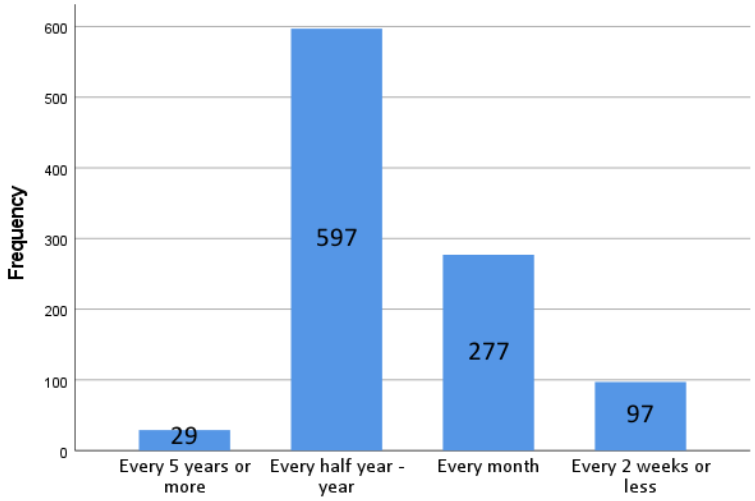
Table 4.6 Six sub-themes consisting of questionnaire and interview results for answering the research question 1

Sub-themes	Questionnaire results	Interview results
4.3.1 Reason for green space users visiting nature	▪ Frequency of visiting nature [BM & EXPO] ▪ Reasons for visiting nature [all sites] ▪ Preferred types of 'nature' [EXPO]	
4.3.2 Representatives and definition of nature	▪ Picture selection of the representation of nature [all sites]	▪ Definitions and descriptions of nature [all sites] ▪ 'Can real nature be accessible to humans' [all sites] ▪ 'Can real nature be created and designed by humans' [all sites]
4.3.3 Perceptions of vegetation in real nature	▪ Perceptions of vegetation in real nature [BM] ▪ Overall impression score on vegetation in real nature [BM]	▪ Descriptions of these perceptions [BM]
4.3.4 Concerns about nature	▪ Concerns about nature [BM]	▪ Descriptions of these concerns [BM]
4.3.5 Nature relatedness	▪ Nature relatedness scale [all sites]	▪ Preferred ways of connecting with nature [all sites]
4.3.6 Interests in nature and childhood nature experiences	▪ Sources of interest in nature [all sites]	▪ Descriptions of childhood nature experiences [all sites] ▪ Attitudes towards childhood nature experiences [all sites] ▪ Comparison between the nature of childhood memory and the current nature [all sites]

4.3.1. Frequency of and Reasons for visiting nature, and preferred types of 'nature'

i) Questionnaire results: Frequency of greenspace users visiting nature

Figure 4.1 Frequency of visiting nature (n=1000, 200 in BM and 800 in EXPO)



The frequency of visiting nature was asked in the Baihua Mountain nature reserve (BM) and EXPO show garden questionnaire surveys respectively to assess the willingness to visit natural areas like BM (BM participants) or

the place mentioned in the last section (EXPO participants). The results showed that the majority of participants visited natural areas every half year to a year (59.7%), while almost 30% of those visited every month (27.7%), just over 10% visited every two weeks or less (9.7%) and visited every five years or more (2.9%).

Table 4.7 Effect of the demographic variables on the frequency of visiting nature

	Sites	Gender	Age	Education	Employment	Income	Occupation	Religion	Childhood	Living
P	< 0.001	NS	NS	NS	NS	NS	NS	NS	0.025	NS
VE	5.2%								1.3%	

Table 4.7 indicated that the frequency of participants surveyed in the BM nature reserve was higher than those surveyed in the EXPO show gardens. Notably, the BM survey took place in 2021 during the COVID-19 pandemic, while the EXPO survey was conducted in 2019 prior to the pandemic. Participants who spent their childhoods in third-tier cities had a lower frequency of visiting nature compared to others.

ii) Questionnaire results: Reasons for greenspace users visiting nature

The reason for going to nature was a fundamental aspect of understanding Chinese greenspace users' attitude to nature and it provides insight into the motivations behind visiting natural environments. A total of 1,600 participants collected in three sites were asked to rate four provided reasons according to importance ranging from 'most important' to 'least important'. The mean of responses was provided, and the socio-demographic results were analysed by the Chi-square tests.

Table 4.8 Diagrams, explanations, and the mean score for four reasons in the questionnaire

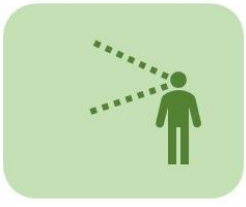
	Reason 1 **Nature as a leisure setting**	Reason 2 **Actively observing nature**	Reason 3 **Wandering/running/taking photos in nature**	Reason 4 **Passing by/living/working around nature**
Diagram				
Explanation	Emphasizes the use of the natural environment as a background, location for passive sedentary	Emphasizes the process of intentionally and attentively looking at, listening to, and engaging with the natural environment for a deeper connection with and understanding of it.	Emphasizes the activity of exploring or experiencing the natural environment through physical activity, such as walking or jogging etc.	Emphasizes being in proximity to the natural environment, such as living or working in an area surrounded by natural features, or simply passing by a natural area during one's daily activities.
Mean	**3.49**	**3.12**	**3.19**	**2.58**

Table 4.8 is provided above and it presents the diagrams, explanations, and mean score for four reasons in the questionnaire. It can be seen from the table that the mean score for the first reason 'Nature as a leisure setting' is the highest among the four reasons, which indicates using nature as the background was the most important reason for participants visiting nature. Conversely, the reason for passing by, living or working around nature was seen as the least important reason.

Table 4.9 Effect of the demographic variables on the four reasons

	Nature as a leisure setting	Actively observing nature	Wandering/running/taking photos in nature	Passing by/living/working around nature
Type	< 0.001	NS[a]	< 0.001	< 0.001
Gender	NS	0.033	< 0.001	NS
Age	0.021	NS	< 0.001	< 0.001
Education	NS	NS	0.045	< 0.001
Employment	< 0.001	NS	0.007	< 0.001
Income	0.039	NS	NS	< 0.001
Occupation	NS	NS	0.008	0.006
Religion	NS	NS	NS	< 0.001
Place-childhood	NS	NS	NS	0.009
Place-current	NS	NS	NS	0.037

Some variables were combined for reporting Chi-square results.
[a] NS indicates not significant at the 95% level.

There is significant evidence of an association between the type of survey place and the reasons for visiting nature. 99% of participants surveyed in the nature reserve considered the reason for nature as a leisure setting is important followed by city parks (97.7%) and designed show gardens (92.6%); In terms of the reason for having activities in nature, 92.3% of participants surveyed in the city park recognized its importance compared to 84.5% and 78.6% of participants surveyed in the nature reserve and designed show gardens. Similarly, 73.7% of city park users considered passing by/living/working around nature is important to visiting nature for them, in contrast to 40.0% and 37.5% of participants surveyed in the nature reserve and show gardens.

The importance of 'nature as a leisure setting' was well-recognized by late adulthood participants (97.7% of late adulthood) compared to 94.0% of young adulthood participants; 97.8% of retired participants acknowledge its importance compared to 78.9% of unemployed participants; Upper-middle (97.4%) and high income (96.4%) participates was more likely to consider it is an important reason for them to visit nature than students (92.7%).

The chi-square test indicated an association between gender and the reason for actively observing nature. 82.5% of female participants considered it is importance reason compared to 78.2% of male participants.

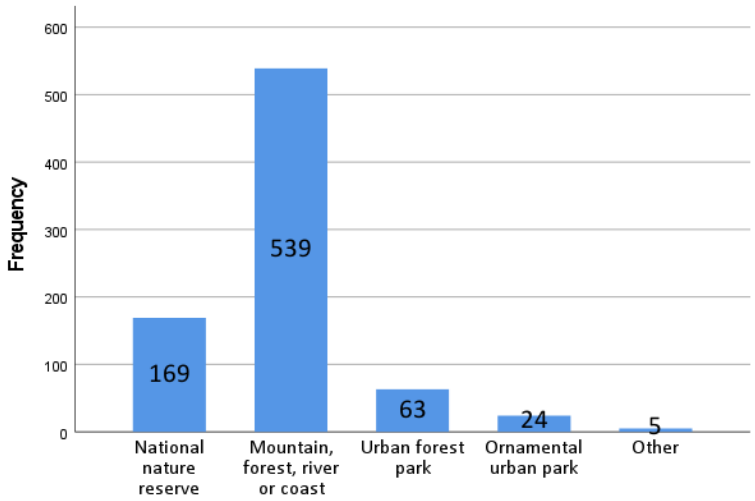
Similarly, female participants tended to agree that having activities like wandering, running, or taking photos in nature were more important (87.7%) than male participants (81.5%). Late adulthood participants (91.4%), participants with less than an undergraduate education (87.9%), and retired participants (90.7%) were more

likely to consider these activities in nature were the important reasons for visiting nature, compared to other ages, education and employment groups. The participants who had other occupations (87.5%) considered activities were more or most important; Conversely, the practitioners related to biological discipline and natural environment considered activities were least or least important for them to visit nature (21.2%).

The reason for passing by, living, and working around nature was statistically associated with many demographic variables: %). Late adulthood participants (67.9%), participants with less than an undergraduate education (65.1%), retired participants (69.1%), middle-income participants (60.4%), and the other-occupation practitioners (56.5%) were more likely to consider this reason was important for visiting nature. 71.0% of Christians and 68.5% of Buddhists also acknowledge the importance of this reason compared to nonreligious and other-religious participants. Meanwhile, participants who spent their childhood in the 1st-tier cities (56.1%) and who currently were living in a town or village (59.3%) also tend to cognize the importance of this reason.

iii) Questionnaire results: Type of 'natural' areas that greenspace users most prefer to visit

Figure 4.2 Type of 'natural' areas that the EXPO participants most prefer to visit (N=800)



In the EXPO questionnaire survey, 800 participants responded with the most preferred type of 'natural' area in favour of understanding natural environments they are interested in. The word natural inside quotation marks refers to the various type of greenspace that is natural for participants. As seen in Figure 4.2, 'mountain, forest, river or coast' was seen by two third of EXPO participants as natural areas that preferred to visit (67.4%), followed by 'national nature reserves' (21.1%). Just around 10% of total EXPO participants chose urban forest parks (7.9%) and ornamental parks (3.0%) as their most preferred natural areas.

4.3.2. Representative and definition of nature to the greenspace users

i) Questionnaire results: Picture selection of the representation of nature

In an attempt to explore the ideal representation of nature in the eyes of 1600 participants in the questionnaire survey, the study involved selecting six images based on two dimensions: the level of human intervention (i.e., heavy artificial vs. minimal artificial) and the scale (i.e., large, medium and small). Participants were asked to select one or more pictures from these images as their ideal representations of nature. Table 4.10 presents the frequency of choosing images representing nature and the relationship between image selection and socio-demographic groups, analysed by the chi-square test.

Table 4.10 Frequency of choosing pictures as the representation of nature

Description	3 Large -Natural	2 Large -Designed	6 Medium -Natural	1 Medium -Designed	5 Small-Natural	4 Small-Designed
Pictures						
F[a] (% total [b])	**1,167 (72.9%)**	**1,137 (71.1%)**	**865 (54.1%)**	**404 (25.3%)**	**378 (23.6%)**	**142 (8.9%)**
Gender	NS	P < 0.001	P = 0.012	NS	P = 0.002	NS
Age	P = 0.044	P < 0.001	P < 0.001	P < 0.001	NS	P < 0.001
Education	P = 0.033	P < 0.001	NS	P < 0.001	NS	P < 0.001
Employment	NS	P < 0.001	P = 0.033	P < 0.001	NS	P < 0.001
Income	NS	P < 0.001	P = 0.036	P < 0.001	NS	P < 0.001
Occupation	NS	P < 0.001	NS	P < 0.001	NS	P = 0.004
Religion	NS	NS	NS	NS	NS	NS
Childhood	NS	P = 0.014	NS	NS	NS	NS
Current living	NS	P = 0.024[c]	P = 0.049[c]	NS	P = 0.008	NS
Living experience	NS	NS	NS	NS	NS	NS

[a] F = Frequency of choosing this picture

[b] Percentage of total valid cases, total =1600. Pictures can be multi-selected, so the percentage was calculated individually.

[c] Sub-grouped into city (including 1, 2 and 3 tier cities) and village (city fringe, town, and village)

Figure 4.3 Image 3 with 72.9% of participants selection(left) and image 2 with 71.1% of participants selection (right)

Image 3 depicts a large-scale natural mountain scene with minimal human intervention

Image 2 depicts a large-scale agricultural artificially-crafted terraced landscape

It was found that Image 3, the natural mountain scene, was widely accepted as the ideal representation of nature. It was commonly selected by late adulthood participants (75.1% of total late adulthood participants), and those with postgraduate and above educational qualifications (79.0% of total postgraduate and above educational qualified participants).

Image 2, the terraced landscape, was particularly favoured by female participants (75.7% of total female participants) and late adulthood participants (85.1% of total late adulthood participants). Furthermore, it was well accepted by participants with less than undergraduate educational qualifications (77.1% of total participants), unemployed participants (94.7% of total unemployed participants), retired participants (82.9% of total retired participants), participants with an income below 8,000 CYN (76.9% of total participants in that income range), and participants with various other studies or occupations (77.9% of total participants in that category).

Figure 4.4 Image 6 with 54.1% of participants selection (left) and image 1 with 25.3% of participants selection (right)

Image 6 depicts a medium-scale natural meadow path

Image 1 depicts a medium-scale Chinese conventional well-pruned garden landscape

Image 6, which depicts a medium-scale meadow path, was chosen as a representative of nature by over half of the total participants. It was more likely to be seen as nature by female participants (57.3% of total female participants) and middle-aged participants (62.2% of total middle-aged participants) with a middle income (59.9% of total middle-income participants). Additionally, 60.3% of participants living in a village also tended to see image 6 as representative of nature.

On the other hand, Image 1, presenting a conventional well-pruned garden landscape of a similar medium scale, was chosen by only a quarter of the total participants (25.3%). Those who selected image 1 were mostly elderly retired individuals with low income (57.0% of total late adulthood participants, 55.0% of total retired participants, and 46.2% of total low-income participants).

Figure 4.5 Image 5 with 23.6% of participants selection (left) and image 4 with 8.9% of participants selection (right)

Image 5 depicts small-scale spontaneous plants in gaps

Image 4 depicts small-scale domestic plants in pots

Image 5, depicting spontaneous plants in gaps, was chosen by approximately a quarter of the total participants (23.6%). It was particularly favoured by female participants (27.1% of total female participants) and urban residents from second-tier cities (35.6%) and third-tier cities (33.7%).

On the other hand, Image 4, which shows domestic plants in pots on a small scale, was the image that least represented nature, selected by only 8.9% of the total 1600 participants. Interestingly, it was more accepted by late adulthood participants (16.3%) compared to young adulthood participants (4.7%) and middle adulthood participants (12.7%).

In summary, the quantitative data from picture selection revealed several patterns in participants' perceptions of nature. The findings indicate that larger scenes, especially those with minimal human intervention or design, were more likely to be seen as representative of nature. Within the same scale, images with less human intervention were also considered more representative of nature. Additionally, medium-scale scenes with fewer cues to care/human intervention were also perceived as nature to some extent. Interestingly, retired

participants in the late adulthood stage tended to choose images that had more human traces or human-oriented elements to represent nature. This suggests that their perception of nature may be influenced by their experiences and preferences, considering a more human-centric landscape.

ii) Interview results: Definitions and descriptions of nature

In addition to the questionnaire survey, interviews were conducted to delve deeper into how greenspace users define, describe and perceive nature. Each interviewee was asked an open-ended question about their understanding or imagination of 'real nature'. From the responses of 44 interviewees from all sites, explicit or implicit definitions of 'real nature' emerged, which were grouped into 4 main themes encompassing 'minimal human intervention', 'large scale or broad view', 'dense, complex and disordered vegetation', and 'variety in type, more vitality, wildlife, and seasonal interests' and 2 additional themes, 'fresh sensations' and 'resemblance to a village environment', as presented in Table 4.11.

Table 4.11 Themes of interviews about the definition of nature

Main Themes	Case	
1. Minimal human intervention	**21**	
*Blended with cities and human-being	1	
2. Large-scale or broad view	**14**	
*Small-scale: plants or microenvironment	2	
3. Dense, complex and disordered vegetation	**23**	
More density, complexity and species in vegetation + tropical-looking		13
Not or minimally ordered		6
Impassability of vegetation cover		4
*Less complexity in vegetation	2	
4. Various types, vibrant dynamic processes, and wildlife	**27**	
Multiple types: water, agriculture, and mountain		10
Natural phenomena, restoration, and vitality		8
Wildlife		7
Seasonal change		2
Additional themes: Evoking fresh sensations	**4**	
Additional themes: Resemblance to childhood nature experiences	**4**	

* Contradictory answers

Themes 1: Minimal human intervention

One widely recognized view among the interviewees was that nature should have 'no or rare human intervention'. Approximately half of the interviewees mentioned this perspective, highlighting their understanding of natural environments with minimal human influence (e.g., LLP 05 and EXPO 06). In this theme, words and phrases such as 'human or artificial trace', 'interruption', 'design', 'management', and 'development' were classified as indicators of human intervention. Some interviewees also referred to 'primitive forests' or used the terms 'primitive' and 'wild' to describe nature, emphasizing the absence of apparent human activity and limited human intervention in their understanding of 'real nature'.

> ***LLP 05 (M, 18-29): Everything comes naturally without any human trace in it.***

> ***EXPO 06 (F, 18-29): I think nature is no artificial trace at all… there's no artificial trace or manual intervention, and it only formed naturally.***

The same viewpoint was expressed by another interviewee (EXPO 17), using the metaphor of bacteria to clarify the relationship between real nature and human beings.

> ***EXPO 17 (M, 30-39): …For example, if we look down at a city or village from an aeroplane, we will see that the road network of the entire city or village is exactly the same as the patterns of the cultured bacteria. Then you suddenly realize that humans are just parasites or bacteria on the earth. What is nature? No man's land is nature.***

In contrast to the previous views, one interviewee (EXPO 19) considered nature an environment blended with cities. In other words, nature is never divorced from human culture and living.

> ***EXPO 19 (F, 18-29): The picture of nature to me is 'the forest is in the city, and the city is in the forest'. The natural scenery is thoroughly blended with cities…We cannot say that nature is entirely uninhabited, which is too far from secular feeling.***

Themes 2: Large scale or broad view

14 interviewees (e.g. EXPO 18, LLP 07, and BM 01) described nature as having a broad view or large scale, similar to the scenes depicted in Images 2 and 3 mentioned earlier. Phrases or words like 'stretch to the horizon', 'flat and open view', 'broad', 'endless', and 'spectacular' were used in the description of nature.

> ***EXPO 18 (F, 18-29): Nature is a relatively large area without human intervention.***

> ***LLP 07 (M, 60-69): Nature is expansive, and it's pretty spectacular.***

BM 01 (M, above 70): ***I like the nature here (BM)… the scenery is particularly good on the top of the mountain… it gives you a feeling of 'All mountains in a single glance'. The scene is especially large, and the surroundings are all lower than it.***

On the contrary, one interviewee (EXPO 16) perceived and defined nature from a micro perspective.

EXPO 16 (F, 18-29)*: I would like to define nature from a micro level. When it comes to nature, the first thought is ornamental grass…some kind of natural ornamental grass or flowers, little ditches and little pools.*

Themes 3: Dense, complex and disordered vegetation

In terms of nature's form, structure and appearance, real nature was reminiscent of a scene with lush visual appearance, high coverage of canopy, dense arrangement of plants, complex arrangement, diverse vegetation structure, and minimally ordered form. 13 interviewees (e.g., EXPO 02 and EXPO 07) had similar descriptions, including four interviewees who mentioned tropical forests.

EXPO 02 (F, 18-29)*: Real nature, in my understanding, but I've never seen it. From a knowledge point of view, it's more southern (referred to as tropical looking) and tropical, but I've never really been in a forest like what I said…*

EXPO 07 (F, 18-29)*: the trees in nature should be very tall and big.*

Two interviewees (WP 05 and WP 09) commented on nature in different ways. They considered nature should be simply looking, with less complexity or biodiversity.

LLP 05 (M, 18-29)*: Nature should not be pruned and designed; that is why it looks simple and has fewer species.*

In the description, six interviewees (e.g. EXPO 16 and BM 07) focused on order and tidiness regarding the structure and appearance of nature.

EXPO 16 (F, 18-29)*: Nature is not geometric, in any shapes, or artificial…… (the vegetation in nature) and has no border or patterns.*

BM 07 (F, 40-49)*: It is real nature… It is not as ordered as artificial plantings. It feels natural to me.*

Four interviewees mentioned the impassability of vegetation cover that nature has no formal or well-paved path or road and used descriptions like 'covered by overgrown vegetation', 'the path will be slippery as it covers

with moss', 'muddy' and 'difficult to walk on'. The descriptions under this code were entwined with the code of human intervention, but it emphasized the particular form in nature.

Themes 4: Various types, vibrant dynamic processes, and wildlife

10 interviewees (e.g. EXPO 13 and EXPO 15) referred to various types of natural places when asked about their impression of nature. Eight of these emphasised water in their descriptions, where the word water was usually mentioned with the word mountain, as a variant of the word 'Shanshui' which means the geographical environment with mountains and water.

> ***EXPO 13 (F, 18-29): When it comes to nature, I will probably think of mountains, rivers and forests first.***
>
> ***EXPO 15 (M, 18-29): Nature ought to have mountains and water of course, and wetlands, there are all kinds of places…***

Eight interviewees (e.g. EXPO 06 and WP10) particularly expressed appreciation for nature's phenomena, restoration, vitality and dynamism, and some of them explained how nature became the nature that they knew and gave examples. In their view, nature is a dynamic process or a product of a specific process rather than an inanimate object that has existed for centuries. To one interviewee (EXPO 09), nature also has a symbol of the vibrant spirit.

> ***EXPO 06 (F, 18-29): All of the landscapes are formed through natural succession, and I mean the evolution of the earth. For example, the canyon, which probably used to be a seabed, now turns into a canyon with time. The meadow, for example, is a natural vegetation community. The coniferous forest and the broadleaf forest are also natural. In my understanding, nature is a kind of natural succession which can change with time.***
>
> ***LLP 10 (M, 60-69): Nature, at the bottom, is a natural selection. All the views and landscapes are what nature gives.***
>
> ***EXPO 09 (F, 18-29): A potted plant is a nature. It might be small, but it has vitality, and that is a kind of nature. The plants are growing in the pot, and it gives you this feeling of the vitality of nature.***

Seven interviewees focused more on wildlife, an essential element in their definition and description of nature. Some interviewees (e.g. WP 05) expressed that the wildlife and their habitat coalesced into a picture of nature.

***EXPO 12 (M, 18-29)*: Nature definitely is not all about plants. It has lots of wildlife, including insects and some small animals.**

***EXPO 15 (M, 18-29)*: Nature has to have creatures…wildlife is essential in nature.**

***LLP 06 (M, 40-49)*: What I imagined is a group of gibbons jumping over the trees in the primitive forest.**

***LLP 05 (M, 18-29)*: Nature ought to have birds, insects… oh and some plants. These can give you a sense of nature.**

Two interviewees (e.g. WP 10) seemed to appreciate nature's seasonal change. In their descriptions of nature, seasonal interests were emphasised and depicted.

***LLP 10 (M, 60-69)*: People love nature, but we must also understand and conform to nature. Spring is colourful, with flowers blooming, and autumn is fruitful. Winter has snow which is the gift of nature. Leaves fell, and the grass withered yellow made some people feel worse than the leafy and flourishing view, but its nature must be exchanged and substituted.**

Additional Themes: Evoking fresh sensations

Four interviewees (e.g. WP 05 and BM 01) focused more on sensory perception when they described nature. The word 'fresh' was primarily used in the description of nature by all of them. Meanwhile, colour (e.g. green, blue and cyan), humidity and temperature (e.g. cold) were mentioned many times.

***LLP 05 (M, 18-29)*: nature is green…and the colour of the green itself represents something fresh. It gives you that earthy and woody smell, and it also gives you that kind of refreshing feeling.**

***BM 01 (M, above 70)*: When you go into nature, the air is fresh. You can tell the difference from the air in the city, especially since the nose can feel the humidity.**

Additional Themes: Resemblance to childhood nature experiences

Four interviewees described nature according to the initial impression and familiarity of nature in their childhood memories, and they all had backgrounds of living in the city fringe, town and village. In their opinion, nature is associated with their past village life or the natural environment they experienced during their childhood, rather than their current urban lifestyle.

***EXPO 05 (F, 18-29)*: If you ask me to imagine nature, I will close my eyes to reminisce about our hometown scenery. (and then described her hometown in Hunan province)**

***EXPO 08 (M, 18-29)*: When you mentioned the word nature, the picture that comes to mind is the scene in my childhood because it impresses me the most. (described the village afterwards)**

***EXPO 21 (F, 40-49)*: Nature is the thing that makes me feel so close to it. I think my first image is the scene from my childhood…a path to the end of our village. If you walk along it, you can find fields of rapeseed, corn and bamboo on the sides.**

To sum up, the greenspace users widely considered that less human intervention on a large scale was the most significant feature of nature. Some of the female respondents or older people with lower educational qualifications may also tend to deem the man-made landscape on a large scale as a good representative of nature. In addition to the large scale, some middle-aged respondents also acknowledged the medium-scale natural landscape with less human intervention as one scene of nature. Some urban residents were likely to take for the spontaneous wild-like landscape as a kind of nature no matter the scale, compared to those who were raised or living in the town or village. Greenspace users defined nature according to the minimal degree of human intervention and large scale but also defined nature based upon its denser and more complex vegetation structure, minimally ordered form, appreciated nature's variety in type, more viability, wildlife, and seasonal interests, and described nature in the light of fresh sensory and familiar nature experience.

iii) Interview results: Thoughts on 'Can real nature be accessible to human-being?'

Regarding the accessibility of real nature and the relationship between the extent of nature intervention and individuals' nature experience, a total of 22 interviewees shared their comments. Across all interviews, it was evident that all participants expressed a strong desire to access and enter nature. They expressed their interest in engaging in light activities such as 'walking', 'playing', 'observing', and 'taking photos' in nature (e.g., EXPO 07).

***EXPO 07 (F, 18-29)*: The nature that I just described only can offer limited human activities like walking, exploring, and taking photographs. The additional recreational activities, such as square dancing or water play areas for children may not be fully provided inside nature that I mentioned.**

The majority of interviewees emphasized the significance of maintaining a balance between human activities in nature and avoiding excessive intervention. They used terms such as 'disturb', 'excessively develop', and

'damage' to express their concerns (e.g., EXPO 05, EXPO 16, and EXPO 20). EXPO 15 pointed out that engaging in heavy activities in nature may lead to a detrimental impact on the natural environment.

> ***EXPO 05 (F, 18-29)**: I want to preserve the original landscape as much as possible and avoid excessive development…… People can visit natural scenic areas and enjoy themselves, but it is important not to disrupt the ecology or engage in activities like picking flowers or damaging plants.*

> ***EXPO 16 (F, 18-29)**: It would be preferable to maintain a certain level of isolation. People can visit, pass through, and enjoy the surroundings, but it's important not to disturb the natural environment.*

> ***EXPO 20 (M, 18-29)**: There can be some artificial elements in nature, but it is preferable for them to serve as complements to enhance the natural scenery, rather than using nature merely as a stilted background for construction.*

Interviewees like EXPO 02 and EXPO 18 provided suggestions regarding the coexistence of human activities and nature. They proposed that human activities could be conducted at the edges of natural areas or designated areas while preserving certain regions for wildlife. This approach may allow for a harmonious balance between human enjoyment and the conservation of natural habitats.

> ***EXPO 02 (F, 18-29)**: I think it could be possible at the edge of real nature.*

iv) Interview results: Thoughts on 'Can nature be created and designed by human-being?'

In order to gain a thorough and comprehensive understanding of individuals' definitions of nature and their relationship with human beings from various perspectives, the research study also included questions that explored whether nature can be created and designed by human beings, as well as the distinctions between designed nature and existing nature. A total of 21 interviewees provided their comments on the topic, with 15 interviewees expressing explicit or implicit belief in the possibility of creating and designing nature, while 6 interviewees considered it to be impossible or deemed the use of terms like 'be created' and 'be designed' as inappropriate.

The majority of interviewees expressed the belief that it is possible for human beings to create and design nature, and they also recognized that designed nature may be more suitable for human appreciation (e.g., EXPO 16 and EXPO 11). EXPO 13 specifically mentioned the Suzhou traditional garden as a good example of designed nature. EXPO 02 acknowledged the possibility of creating and designing nature but also highlighted

the limitations in terms of maintenance. Furthermore, some interviewees demonstrated an understanding of the nuances between designed nature and existing nature, noting that designed nature has weaker natural succession (e.g., EXPO 20) and higher maintenance costs (e.g., EXPO 19).

> ***EXPO 16 (F, 18-29): I think it's possible, and you can enhance the natural beauty with some slight artificial embellishments to highlight its best features.***

> ***EXPO 11 (M, 18-29): In natural environments, where no human intervention is involved, the existence of plants serves the purpose of their own survival and thriving, rather than conforming to human aesthetic preferences…… Natural environments and artificially designed environments have different perspectives and intentions. Therefore, it is understandable to think that designed environments may be more suitable for human appreciation.***

> ***EXPO 02 (F, 18-29): I think nature can be created, but it seems challenging for humans to maintain it artificially, as it requires significant effort and expertise.***

Out of the 6 interviewees who believed it was impossible to create nature, some expressed the viewpoint that designed nature cannot be considered as 'real nature' and lacks the authenticity found in natural environments (e.g., EXPO 13). Moreover, certain interviewees suggested that terms like 'restore' 'integrate' and 'mimic' would be more appropriate to describe the incorporation of nature, reflecting a humbler attitude towards nature.

> ***EXPO 13 (F, 18-29): It (creating nature) needs time……Some designed elements can sometimes feel soulless and mundane. While they may be green and create a sense of relaxation in the city, they can lack authenticity and can be too simplistic.***

4.3.3. Perceptions of vegetation in real nature

i) Questionnaire results: Perceptions of vegetation in real nature

A total of 200 face-to-face questionnaires were administered in a real natural setting, specifically at Baihuan Mountain National Nature Reserve. The questionnaire included a series of perceptual questions on vegetation in real nature, and these perceptual variables were analysed using Principal Component Analysis (PCA) to condense them into three components. The names of each component and the loadings of each item can be found in Table 4.12 below.

Table 4.12 The loading of individual attitudinal variables onto specific factors

	Component loading			Eigenvalue	Variance
Component 1: Attractiveness and restorativeness				2.896	26.329%
Attractive	0.812				
Colourful	0.794				
Natural	0.685				
Peaceful and relaxed	0.653				
Exquisite	0.526				
Component 2: Complexity and disorder				2.612	23.747%
Complex		0.857			
Denser		0.793			
Messier		0.783			
Less cared for		0.678			
Component 3: Danger and boredom				1.073	9.752%
Sometimes feel unsafe alone			0.711		
Boring			0.465		
Components 1-3 accounted for 59.828% of the total variance.					
KMO= 0.729, Bartlett's test of Sphericity Sig < 0.001					

Table 4.13 presented below displays the outcomes of one-way ANOVA, where the three principal perceptual components were taken as dependent variables, and seasons and participants' socio-demographic variables were taken as independent variables. Post hoc multiple comparisons using the Tukey tests were conducted to identify specific differences within the groups.

Table 4.13 Effect of the seasons and socio-demographic variables on the perceptual components

	Component 1 Attractiveness and restorativeness				Component 2 Complexity and disorder				Component 3 Danger and boredom			
	F	*df*	*p*	*VE* [a]	*F*	*df*	*p*	*VE*	*F*	*df*	*p*	*VE*
Season variable												
Season	-	-	NS [b]	-	-	-	NS	-	-	-	NS	-
Socio-demographic variables												
Gender	-	-	NS	-	-	-	NS	-	-	-	NS	-
Age	-	-	NS	-	5.041	4, 195	**< 0.001**	9.4%	2.612	4, 195	**0.037**	5.1%
Education	-	-	NS	-	3.376	3, 196	**0.019**	4.9%	4.834	3, 196	**0.003**	6.9%
Employment	-	-	NS	-	2.334	5, 194	**0.044**	5.7%	-	-	NS	-
Income	-	-	NS	-	-	-	NS	-	-	-	NS	-
Occupation	-	-	NS	-	-	-	NS	-	-	-	NS	-
Religion	-	-	NS	-	-	-	NS	-	-	-	NS	-
Place for growth	-	-	NS	-	-	-	NS	-	-	-	NS	-
Place of living	-	-	NS	-	-	-	NS	-	3.897	1, 198	**0.050**	1.9%
Pattern of living	-	-	NS	-	-	-	NS	-	-	-	NS	-

[a] Variance explained.
[b] NS indicates not significant at the 95% level.

No significant differences were found between the summer and autumn seasons, as well as participants' socio-demographic variables, in relation to the perception of attractiveness and restorativeness.

Differences in perception of complexity and disorder were observed in relation to participants' age, educational qualification, and employment status. Younger participants aged 18-29 perceived significantly more complexity and disorder in vegetation compared to older participants aged 40-49 and 50-59. Participants with higher educational qualifications with postgraduate degrees and above, also perceived greater complexity and disorder in BM's vegetation compared to those with lower levels of education (high school or below, and junior college or equivalent degrees). Homemakers, on the other hand, perceived less complexity and disorder than full-time employed individuals, self-employed participants, and students.

Regarding the perception of danger and boredom, participants above the age of 60 perceived the vegetation as more dangerous and boring compared to those aged 30-39 and 40-49, although the differences were somewhat limited. Participants with postgraduate degrees perceived less danger and boredom in the vegetation compared to those with undergraduate degrees or high school or below. In terms of current residence, participants living in villages, towns, or city fringes perceived the vegetation as more dangerous and boring than those living in urban areas, regardless of the city hierarchy.

Table 4.14 Correction between perceptual components and the variables in relation to overall impression score on vegetation, participants' NR scores, and other participants' background information

	Component 1 Attractiveness and restorativeness		Component 2 Complexity and disorder		Component 3 Danger and boredom	
	r	*p*	*r*	*p*	*r*	*p*
Spearman's rank correlation						
Frequency of visiting nature	--	NS	--	NS	0.143	**0.044**
Childhood nature experience	0.309	**< 0.001**	--	NS	--	NS
Tree species diversity	0.372	**< 0.001**	--	NS	--	NS
Possible to create real woodland	--	NS	--	NS	0.243	**< 0.001**

NS indicates not significant at the 95% level

Table 4.14 shows the correlation between perceptual components and background variables.

Participants who had more childhood experiences in nature perceived greater attractiveness and restorativeness in natural vegetation. Additionally, there was a positive correlation between the perception of attractiveness and restorativeness and agreement with the importance of tree species diversity for wildlife habitat.

There is no evidence suggesting a correlation between the perception of complexity and disorder of natural vegetation and participants' background variables.

The perception of danger and boredom in BM's planting is positively correlated with frequent visits to natural areas and the support for designing natural woodland in cities. This means that participants who visit natural

areas more frequently perceive the planting as more dangerous and boring. Similarly, participants who support the idea of designing natural woodland in urban areas also perceive planting as more dangerous and boring.

In summary, individuals who visited natural areas frequently or had many opportunities to experience nature were more likely to perceive natural vegetation as attractive and restorative. Young adults with higher educational qualifications showed a better understanding of the complexity and disorder in vegetation. Surprisingly, participants who visited natural areas more often perceived more danger and boredom in BM's vegetation. This unexpected finding suggests that frequent visits to natural areas may not reduce the sense of insecurity or boredom when walking alone in nature. Additionally, individuals who believed in the possibility of creating and designing nature in urban areas also perceived more danger and boredom. Among older adults, those with lower educational qualifications and those living in rural areas had a heightened perception of danger and boredom.

ii) Questionnaire results: Overall impression score on vegetation in real nature

Similarly, 200 participants were asked to provide an overall impression score for vegetation in a real natural setting.

Table 4.15 Effect of the demographic variables on the participants' overall impression score on vegetation in real nature

	Gender	Age	Education	Employment	Income	Occupation	Religion	Childhood	Living	Pattern
P	NS [b]	< 0.001	0.010	NS	0.021	0.030	NS	NS	0.014	0.005
VE [a]		17.8%	5.6%		5.7%	5.3%			3.0%	5.2%

[a] VE = Variance Explained.
[b] NS indicates not significant at the 95% level

Table 4.15 presents the results of a one-way ANOVA, where the overall impression score of vegetation is the dependent variable, and participants' socio-demographic variables serve as independent variables. Variations in the overall impression score are observed based on age, educational qualification, income, occupation, current living place, and living pattern.

In terms of age, middle adulthood participants (40-59 years old) gave a significantly higher score to real natural vegetation compared to young adults (18-39 years old). Participants with high school or lower education also gave a significantly higher score than those with postgraduate or higher qualifications. Students without income tended to give lower scores than those earning less than 4,000 CYN. Notably, practitioners in creative practice and design disciplines tended to give lower scores for natural vegetation compared to those in 'other' disciplines. Regarding current residence, participants living in urban areas during the survey tended to give lower scores to natural vegetation than those residing in villages and towns. Similarly, considering living

patterns, individuals who grew up in villages and later moved to urban areas tended to give lower scores for natural vegetation than those who remained in villages since childhood.

Table 4.16 Correction between overall impression score on vegetation and perceptual components, participants' NR scores, and other participants' background information

	Overall impression score	
	r	*p*
Person correlation		
Perception of vegetation - Attractiveness and restorativeness	0.311	**< 0.001**
Perception of vegetation - Complexity and disorder	**-0.169**	**0.017**
Perception of vegetation - Danger and boredom	--	NS
Spearman's rank correlation		
Frequency of visiting nature	0.194	**0.006**
Childhood nature experience	--	NS
Tree species diversity	--	NS
Possible to create real woodland	--	NS

NS indicates not significant at the 95% level

As shown in Table 4.16, a positive correlation exists between the overall impression score of vegetation in real nature and the perception of attractiveness and restorativeness. In contrast, a negative correlation is observed with the perception of complexity and disorder in the vegetation. Additionally, there is a trend indicating that participants who visit nature more frequently tend to assign higher scores to the natural vegetation in real nature.

iii) Interview results: Descriptions of the perceptions in real nature

Some interviewees perceived the attractiveness and restorativeness of nature according to its naturalness and rareness (e.g., BM02, BM 04 and BM 07). At the same time, the previously defined characteristics of nature were also perceived by interviews which made them enjoyable and delighted: a broad view, complex vegetation structure, variety in type and fresh sensory.

BM 02 (M, 18-29): I like here. Nature like here, I mean pure nature, is relatively rare in the city. I am glad to see it.

BM 04 (F, 40-49): I feel relaxed here... The vegetation is rich, probably because of the high altitude. The species is rich and various from a low altitude to a high altitude.

BM 07(F, 40-49): The layering and openness are rare. it's nice to have water and mountains here, and the air is fresh. I like this feeling which is hard to have in the city parks. In addition, there

are very few people here, so I enjoy it very much…and the main colour of autumn scenery is red, some yellow mixed with some green which gives me a colourful feeling.

In general, most interviewees did not describe natural vegetation as disordered or messy, as observed in the responses of BM 02, BM 03 and BM 05. Instead, they recognized the complexity of natural vegetation communities, as highlighted by the species diversity and layered structure, as mentioned by BM02. Moreover, there is a consistent trend in the previous qualitative findings that individuals with higher educational qualifications tend to have a greater perception of complexity.

BM 02 (M, 18-29, Postgraduate, environmental-related discipline): The diversity of species is very high. It is clear to see the lower, middle, and upper layers.
KC: Does it give you the feeling of disorder or denseness? Or any negative feelings?
BM 02: No, no, not at all. This is enjoyable.

BM 03 (M, 50-59): I can't say it's messy, and I think it is what the wild place looks like.

BM 05(F, 18-29): No, it is not messy. I think that is the way nature should be - Not to be too ordered.

Regarding the perception of danger and boredom in natural environments, it was observed that some interviewees, such as BM 01, tended to recognize the potential dangers within the broader societal context, primarily focusing on concerns related to criminal activities. However, when considering primitive or real wild environments, most interviewees acknowledged the inherent power and unpredictability of nature, leading to a sense of respect and fear towards nature. Regarding boredom, BM 07 expressed that the natural scene may be less abundant but is far from being boring, it may be due to the scale of natural landscapes.

BM 01 (M, above 70): No, I don't feel unsafe. Because the big environment and whole society are safe. There's no robbery or other crime, so I don't feel unease. And, this is a large forest, and this is a park, it's not a primitive forest. If here is a primitive forest, I would feel unsafe and frightened, as human beings must fear (respect) nature.

BM 07 (F, 40-49): Compared to the […another large scenic spot], the scene here is a little bit less, after all, it is a mountain, not as big as there.

4.3.4. Concerns about nature

i) Questionnaire results: Concerns about nature

The questionnaire also included a section where participants could express their concerns about the natural environment and rate their importance. Out of all 200 participants, 7 individuals (3.5% of the total) indicated that they had no concerns at all about the natural environment in Baihua Mountain National Nature Reserve (BM). Additionally, 3 participants provided extra written responses mentioning 'worried about the thorny and prickly plants', 'there are no communication signals, compass, or maps', and 'too many tourists'.

The names of each 'concerns' component derived from the PCA analysis and the loadings of each item can be found in Table 4.17 below.

Table 4.17 Component loadings from PCA with varimax rotation for individual concerns variables

	Component loading			Eigenvalue	Variance
Component 1: Unknown dangers and illegibility				3.635	40.392%
I am not sure where the path goes	0.802				
Potentially dangerous animals or poisonous plants	0.716				
No signs, shops, shelters, streetlights, or other urban cues	0.663				
The path is bumpy-unmade	0.660				
Component 2: Unkempt dense vegetation				1.203	13.362%
The plants are not cared for		0.881			
The plants are very close to me		0.877			
I cannot see through the woodland vegetation		0.539			
Component 3: Litter and crowds				1.013	11.261%
Too many litters			0.857		
There are very few people here			-0.543		

KMO=.806, Bartlett's test of Sphericity Sig < 0.001

Components 1-3 accounted for 65.014% of the total variance.

Table 4.18 Mean scores for three 'concerns' principal components and the contained specific question variables

Component	Mean	Specific variables	Mean
Unknown dangers and illegibility	2.794	I am not sure where the path goes	2.881
		Potentially dangerous animals or poisonous plants	2.933
		No signs, shops, shelters, streetlights, or other urban cues	2.881
		The path is bumpy-unmade	2.482
Unkempt dense vegetation	2.054	The plants are not cared for	1.979
		The plants are very close to me	1.886
		I cannot see through the woodland vegetation	2.295
Litter and crowds	2.777 [a]	Too much litter	3.052
		There are very few people here	2.503

[a] according to the previous loading table above, the mean of components 3 litter and crowds was not accurate, as it contained a negative loading. It was provided for reference only.

Table 4.18 above displays the mean scores for the principal components of 'concerns in nature' and the specific question variables included within them. From the table, it is evident that participants considered 'too much litter' as the most significant concern in the BM's environment. The second most crucial concern was 'potentially dangerous animals or poisonous plants', followed by anxiety about 'not sure where the path goes' and worries regarding the absence of signs, shops, shelters, streetlights, or other urban cues in the nature reserve. In contrast, participants had minor concerns about getting close to plants or perceiving them as uncared for. Overall, the concerns related to 'unkempt dense vegetation' were fewer compared to the concerns about 'unknown dangers and illegibility', and 'litter and crowds' in the natural wilderness environment.

Table 4.19 Effect of the seasons, background, and demographic variables on the 'concerns' principal components

	Component 1 Unknown dangers and illegibility				Component 2 Unkempt dense vegetation				Component 3 Litter and crowds
	F	*df*	*p*	*VE* [a]	*F*	*df*	*p*	*VE*	*p*
Season variables									
Season	--	--	NS [b]	--	--	--	NS	--	NS
Socio-Demographic variables									
Gender	5.441	1, 191	**0.019**	2.8%	--	--	NS	--	NS
Age	2.856	5, 187	**0.016**	7.1%	--	--	NS	--	NS
Education	--	--	NS	--	8.625	3, 189	**< 0.001**	12.0%	NS
Employment	--	--	NS	--	--	--	NS	--	NS
Income	--	--	NS	--	3.902	4, 188	**0.005**	7.7%	NS
Occupation	--	--	NS	--	--	--	NS	--	NS
Religion	--	--	NS	--	--	--	NS	--	NS
Place for growth	2.444	4, 188	**0.048**	4.9%	--	--	NS	--	NS
Place of living	--	--	NS	--	2.920	3, 187	**0.035**	4.5%	NS
Pattern of living	--	--	NS	--	--	--	NS	--	NS

[a] Variance explained.
[b] NS indicates not significant at the 95% level.

Table 4.19 presents a statistically significant difference in the 'concerns' principal components of unknown dangers and illegibility among different gender groups, age groups, and places for growth groups. Female participants showed a higher likelihood of having concerns about unknown dangers and the absence of human traces in nature compared to males. Participants in the age group of 50-59 expressed fewer concerns about unknown dangers compared to young individuals aged 18-29. Participants who grew up in the city fringe exhibited fewer concerns about unknown dangers and artificial cues in nature compared to those who grew up in first-tier cities.

Regarding the 'concerns' component of unkempt dense vegetation, there was a statistically significant difference among educational qualification groups, income groups, and current residence groups. Participants with a high school or below educational qualification showed significantly more concerns about BM's unkempt dense vegetation compared to those with higher educational qualifications such as undergraduate and

postgraduate degrees. Similarly, participants with lower incomes expressed more concerns about unkempt dense vegetation than those with higher incomes and students. Participants residing in villages or towns were also more likely to have concerns about vegetation compared to those living in first-tier cities.

No significant differences were found between seasons and socio-demographic groups in the 'concerns' principal components related to litter and crowds.

Table 4.20 Correlation between the concerning component, perceptual and background variables

	Component 1 Unknown dangers and illegibility		Component 2 Unkempt dense vegetation		Component 3 Litter and crowds	
	r	*p*	*r*	*p*	*r*	*p*
Pearson's correlation						
Attractiveness and restorativeness	--	NS	--	NS	0.232	**0.001**
Complexity and disorder	0.154	**0.032**	--	NS	--	NS
Danger and boredom	0.444	**< 0.001**	0.357	**< 0.001**	--	NS
Overall impression score on vegetation	--	NS	--	NS	0.175	**0.015**
Spearman's rank correlation						
Frequency of visiting nature	--	NS	-0.200	**0.005**	--	NS
Childhood nature experience	--	NS	--	NS	--	NS
Tree species diversity	0.143	**0.047**	--	NS	--	NS
Possible to create real woodland	--	NS	0.201	**0.005**	--	NS

Table 4.20 reveals a positive correlation between concerns about unknown dangers and illegibility and the perceptual variables of 'complexity and disorder' and 'danger and boredom'. This suggests that participants who have higher concerns about unknown dangers and illegibility tend to perceive greater complexity and disorder in the environment and experience a sense of danger and boredom. Additionally, there is a positive correlation between these concerns and the agreement with the importance of tree species diversity for wildlife habitat. In other words, participants who are more concerned about unknown dangers and illegibility are more likely to recognize the value of tree species diversity for supporting wildlife habitat.

Concerns about unkempt dense vegetation show positive correlations with the perception of danger and boredom, as well as the belief in the possibility of creating woodland in the city. This means that participants who express greater concerns about unkempt dense vegetation are more likely to perceive higher levels of danger and boredom in BM's environment, and they are also more inclined to believe that it is feasible to design and create woodland in urban areas. On the other hand, concerns about unkempt dense vegetation exhibit a negative correlation with the frequency of visiting natural areas. This suggests that the more often individuals engage with nature, the less likely they are to express concerns about the overgrown vegetation in BM's environment.

Concerns about litter and crowds are positively correlated with the perception of attractiveness and restorativeness in the natural environment. This suggests that participants who perceive higher levels of attractiveness and restorativeness are more likely to express concerns about litter and crowds in the natural environment.

ii) Interview results: Descriptions of concerns in Baihua Mountain National Nature Reserve (BM)

In relation to unknown dangers and illegibility, some interviewees, such as BM 03 and BM 04, expressed concerns about 'getting lost' in nature, in addition to the potential dangers associated with animals mentioned in the previous questionnaire results. BM 01 (M, over 70) specifically mentioned that he is particularly worried about getting lost in nature as he grows older. BM 08 mentioned the absence of urban cues like shops, which could contribute to a sense of unease.

> ***BM 03 (M, 50-59): Dangerous animals and getting lost. I am afraid of these……I dislike this uneven, bumpy path.it is not good for my legs.***

> ***BM 04 (F, 40-49): Because some parts of the mountain don't have a signal, and if you lose contact, you're in danger.***
> ***KC: Are you afraid of some animals and plants, potentially dangerous ones?***
> ***BM 04: Not so much. I am just afraid of getting lost.***

> ***BM 08(M, 30-39): There's nothing here. Nothing to eat, nothing to play, nothing to buy.***

With regards to unkempt dense vegetation, only BM 06 mentioned concerns related to the mountainous terrain and dense woodland of the natural environment. BM 06 highlighted that the environment of BM is different from other flat natural areas, and this distinction may lead to worries about navigating the natural environment due to the unease of being unable to see through dense woodland.

> ***BM 06 (F, 40-49): You can't see through the woodland. In a forest like this, you can't see much until you get to the top of the mountain.***

Regarding litter, it was not mentioned as a concern by any of the interviewees in BM. However, BM01 did mention that having litter bins in the natural environment is essential. Additionally, BM10 expressed that fallen leaves should not be seen as litter but rather as evidence of nature. Interestingly, none of the interviewees expressed concerns about there being too few people, which could make them feel unsafe. On the contrary, interviewees such as BM 08 expressed concerns that large crowds may disrupt the quiet and natural ambience of the environment.

***BM 10 (F, 18-29)*: when we go up to the mountain, I can see the fallen leaves on the path, but it doesn't affect my feeling and mood, I think it's natural. If the path is neat and clean, well, I think it might be well-managed, but I think it's okay if it's not managed.**

***BM 08 (M, 30-39)*: In fact, I want to find a quiet place with fewer people in nature. I don't want to visit a place that is very crowded even in the city.**

4.3.5. Nature relatedness

i) Questionnaire results: Nature relatedness scale

In this research, participants' subjective relatedness to nature is considered a significant aspect of exploring public attitudes towards nature. A 1600 questionnaire survey was conducted, where participants were asked to rate six questions from the NR-6 scale on a 5-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). The NR-6 score was calculated by averaging the responses to these six questions, with a higher score indicating a stronger connectedness to nature. To analyse the data, one-way ANOVA was conducted to compare the mean of different groups. Pearson's correlation and Spearman's rank correlation were carried out for the association between numerical and categorical variables.

Table 4.21 presents the mean NR-6 scores for the overall sample of 1,600 participants, as well as for each specific research site. These scores were calculated based on self-reported questionnaires. Table 4.22 provides a summary of the statistical analysis conducted to compare the means of NR-6 scores between different research sites and socio-demographic groups, using One-way ANOVA.

It can be seen from the two tables that there was a medium effect size on the difference between the specific research site on participants' NR-6 scores; the NR-6 score of the participants surveyed in the Woodland Park (WP) in urban park was the highest score among the five research sites, and those surveyed in the Beijing Garden (BG) in the EXPO received the lowest score; overall, the NR-6 score of the participants surveyed in the EXPO was significantly less than those surveyed in the BM nature reserve and Lotus Lake Park (LLP) city park. On the other hand, people felt more nature-relatedness in the WP and 'New Silk Road' Garden (NSR) with more natural plantings, compared with the Traditional Park (TP) in the urban park and BJ garden in EXPO with more conventional plantings.

Table 4.21 Mean score of the NR-6 score for overall 1600 participants and each research site

Site	**Overall** (N=1600)	**BM** (N=200)	**LLP** (N=600)		**EXPO** (N=800)	
Mean	4.1117	4.2650	4.2509		3.9561	
			WP (N=400)	**TP** (N=200)	**NSR** (N=400)	**BJ** (N=400)
			4.3025	4.1992	4.0225	3.8896

Table 4.22 Effect of the demographic variables on the participants' NR-6 score

	Sites	**Gender**	**Age**	**Education**	**Employment**	**Income**	**Occupation**	**Religion**	**Childhood**	**Living**
P	< 0.001	NS	< 0.001	0.005	< 0.001	< 0.001	NS	NS	NS	NS
VE	10.6%		6.7%	0.8%	4.9%	3.6%				

[a] VE = Variance Explained.
[b] NS indicates not significant at the 95% level.

The analysis also reveals significant differences in participants' NR-6 scores based on both the research sites and socio-demographic factors such as age, educational qualification, employment status, and income. From the data, it also can be found that there was a significant difference between age groups on NR-6 score, and participants' NR-6 score increased with their age. Participants with high school and below educational qualifications tended to have a higher NR-6 score than those with undergraduate and above qualifications. This finding does not rule out the influence of the age factor that the educational level of elder participants was lower than the young. The result of employment status appeared to be consistent with the result of age: the retired participants were more likely to get a higher NR-6 score than full-time employed participants and students. Among the employment status groups, students had the lowest NR-6 score. Similarly, in terms of income, the students were significantly different from other income groups, and there was no difference in the amount of income on the NR-6 score.

Table 4.23 Correlation between participants' NR-6 score and the perceptual components, overall impression score on natural vegetation, and concerning components

	NR-6 score		
	p	*r*	*N*
Pearson's correlation - Perceptual components			
Attractiveness and restorativeness	< 0.001	0.465	200
Complexity and disorder	NS	--	--
Danger and boredom	NS	--	--
Pearson's correlation			
Overall impression score on vegetation in real nature	0.020	0.165	200
Pearson's correlation - concerns components			
Unknown dangers and illegibility	NS	--	--
Unkempt dense vegetation	NS	--	--
Litter and crowds	< 0.001	0.283	193

NS indicates not significant at the 95% level

Table 4.23 demonstrates a positive correlation between participants' NR-6 score and the perceived attractiveness and restorativeness of vegetation in real nature. Similarly, a higher NR-6 score corresponds to a greater likelihood of assigning a high score to vegetation in real nature. Furthermore, participants with higher NR-6 scores are more likely to express concerns about issues related to litter and crowds in natural environments.

ii) Interview results: Preferred ways of connecting with nature (Distance proximity vs. close proximity)

A total of 16 interviewees provided responses to the question regarding their preference for connecting with nature remotely from the path or getting closer by entering the forest. Among them, 4 interviewees expressed a preference for close proximity, 6 interviewees preferred to maintain a distance, and the remaining 6 interviewees stated that their preference would depend on specific conditions.

For those who preferred close proximity, their reasons included the desire to observe nature in more detail, explore the various stages of growth of organisms, have a tactile experience to truly connect with nature, and create more enjoyable experiences such as playing hide-and-seek. LLP 06 also suggested the provision of designated areas in nature to prevent human activities from causing harm to the natural environment.

> ***LLP 06 (M, 40-49): Definitely, we hope to protect nature. But can we develop a small accessible space? Right, not the entire natural area needs to be open to the public, but having designated specific entry points can be considered.***

For those interviewees who preferred distance proximity, their reasons included concerns about getting lost in nature and avoiding disturbing wildlife and appreciation of magnificent scenery that stretches into the distance.

Among the interviewees who stated that their preference would depend on specific conditions, BM 01 (M, above 70) expressed the willingness to get closer to plants if he were younger. LLP 03 mentioned that the attractiveness of the scenery may influence their decision, indicating that the specific context and visual appeal play a role in their choice of proximity to nature.

> ***LLP 03 (F, 30-39): I think it depends on the situation. For a place like this (woodland park in Lotus Lake Park), I feel it's best to sit outside quietly and enjoy the view. But if, for example, it's an area filled with flowers and clearly designated as an attractive viewing spot, then people might be more inclined to enter, visit, and take photos.***

4.3.6. Interest in nature and childhood nature experience

i) Questionnaire results: Sources of interest in nature

In the questionnaire survey, participants' interests in nature were investigated by 7 source variables. All 1,600 participants were asked to rate 7 variables from 'most important' to 'least important'. Table 4.24 reveals that 'playing outside as a child' was rated the most important and 'Traditional philosophical thoughts' were the least important.

Table 4.24 Mean score of sources variables of interest in nature

Sources of interest in nature	Mean
Playing outside as a child	3.38
Travelling to a wild place	3.37
Interested in wild plants and animals in nature	3.28
Chinese traditional garden	2.98
Calligraphy/literature/poem	2.83
Landscape painting	2.76
Traditional philosophical thoughts	2.59

In order to facilitate the understanding of the main factors that influenced participants' interest in nature, seven interest source variables were condensed into two factors by Principal Component Analysis (PCA). Table 4.25 below provides the Kaiser-Meyer-Olkin (KMO) score, variables labels and the loadings for each variable. The KMO for PCA is 0.812, and the statistical significance of Bartlett's test of Sphericity is 0.000, suggesting that it is plausible to conduct factor analysis. The PCA analysis identified two components, 'Traditional Chinese culture' and 'Personal experience' from the seven questions. These components were used as dependent variables in subsequent ANOVA and correlation tests to explore differences among groups and relationships between variables.

Table 4.25 The loading of individual interest variables onto specific factors

	Component loading		Eigenvalue	Variance
Component 1: Traditional Chinese culture			2.903	41.472%
Calligraphy/literature/poem	0.803			
Landscape painting	0.791			
Chinese traditional garden	0.770			
Traditional philosophical thoughts	0.673			
Component 2: Personal experience			1.083	15.472%
Travelling to a wild place		0.746		
Playing outside as a child		0.692		
Interested in wild plants and animals in nature		0.670		
Components 1 and 2 accounted for 56.944% of the total variance.				

KMO= 0.812, Bartlett's test of Sphericity Sig < 0.001

Table 4.26 Effect of the site, season and demographic variables on the two interest factors

	Component 1 Traditional Chinese culture				Component 2 Personal experience			
	F	*df*	*p*	*VE* [a]	*F*	*df*	*p*	*VE*
Site and Season variables								
Research places	9.177	2, 1597	< 0.001	1.1%	--	--	NS	--
Season	--	--	NS [b]	--	--	--	NS	--
Demographic variables								
Gender	12.598	1, 1598	< 0.001	0.8%	--	--	NS	--
Age	5.795	5, 1594	< 0.001	1.8%	7.156	5, 1594	< 0.001	2.2%
Education	11.163	3, 1596	< 0.001	2.1%	15.850	3, 1596	< 0.001	2.9%
Employment	5.202	6, 1593	< 0.001	1.9%	4.626	6, 1593	< 0.001	1.7%
Income	4.479	6, 1593	< 0.001	1.7%	4.372	6, 1593	< 0.001	1.6%
Occupation	4.426	4, 1595	0.001	1.1%	3.483	4, 1595	0.008	0.9%
Religion	4.825	5, 1594	< 0.001	1.5%	--	--	NS	--
Place for growth	2.659	5, 1594	0.021	0.8%	--	--	NS	--
Place of living	--	--	NS	--	3.449	5, 1594	0.004	1.1%
Pattern of living	--	--	NS	--	7.463	2, 1583	< 0.001	0.9%

[a] VE = Variance Explained.
[b] NS indicates not significant at the 95% level.

Table 4.26 above summarizes the results of the One-way ANOVA used to compare means between different sites and seasons, backgrounds, and demographic groups on the interest components. The table shows that participants' interests in nature influenced by traditional Chinese culture had a significant difference across survey places. Specifically, participants surveyed in the city park (i.e., LLP) tended to attribute their interests to traditional cultural influences compared to those surveyed in the nature reserve (i.e., BM) and show gardens (i.e., EXPO), who considered themselves less impacted by culture.

Female participants' interests in nature were more likely to be influenced by traditional Chinese culture compared to male participants. Elder participants were more likely to attribute their interest to cultural factors, while young participants tended to believe their personal experience significantly impacted their interests in nature. In terms of educational qualifications, low-level educated participants were more likely to consider that traditional culture prompted an interest in nature, while high-level educated participants were more likely to appreciate their personal experience.

Regarding employment status, full-time employed participants tended to consider their interests in nature as coming from their personal experience rather than traditional Chinese culture, which was the opposite situation of retired participants. Similarly, high-paid and upper-middle-paid participants considered their interests as more influenced by experience and less influenced by culture, which was significantly different from the other groups. Interestingly, students in both employment and income variables considered neither traditional culture nor personal experience to have significant impacts on their interests in nature.

Regarding participants' occupations or studies, those who chose disciplines not listed on the questionnaire believed their interests were more influenced by culture rather than their experience, which was significantly

different from many listed disciplines. The practitioners of biological discipline and natural environment were exceptional and similar to the student group, as neither traditional culture nor personal experience was considered the primary reason for having an interest in nature.

In terms of religion, Daoists and Buddhists tended to acknowledge the significant impact of traditional Chinese culture on their interests in nature compared to non-religious participants. However, Confucianism is one of the native Chinese philosophies and is significantly different from Daoism. Confucianists believed their interest in nature was less impacted by Chinese culture.

Participants who grew up in first-tier cities believed that traditional culture in relation to nature significantly influenced their interests in nature compared to those who grew up in third-tier cities, city fringes, or towns and villages. In terms of personal experience, current residents of first-tier cities had a significant difference from those living in city fringes, towns, or villages, with first-tier citizens more likely to recognize the value of personal experience in their interests in nature. Participants who grew up and were still living in villages tended to consider their interests in nature as unaffected by personal experiences, which was significantly different from those who grew up in villages and moved to cities after growth and those who grew up and were still living in cities.

Table 4.27 Correlation between the interest factors and background variables

	Component 1 Traditional Chinese culture		Component 2 Personal experience	
	p	*r*	*p*	*r*
Spearman's rank correlation				
Childhood nature experience	< 0.001	0.155	< 0.001	0.314
Prefer geometric planting patten	< 0.001	0.181	NS [a]	--
Having wildlife in cities	< 0.001	0.016	< 0.001	0.261
Tree species diversity	< 0.001	0.182	< 0.001	0.227
Climate change	0.022	0.061	< 0.001	0.242
Environment is important	0.005	0.075	< 0.001	0.227
Possible to create real woodland	< 0.001	0.275	< 0.001	0.182
Pearson's correlation				
NR-6 mean score	< 0.001	0.243	< 0.001	0.327

[a] NS indicates not significant at the 95% level.

Table 4.27 above presents the correlation between the background variables and interest factors. It can be seen that most of the background variables had a positive correlation with the two interest factors at small effect sizes, except for the factor of preferring organized planting patterns. The more remarkable correlation in the medium effect size is with the interest factor of personal experience and background factors of childhood experience in nature and participants' NR-6 score. The more chances in nature in the participants' childhoods, the more likely that participants considered these experiences about nature had a great impact on their interest in nature. Meanwhile, the higher the NR-6 scores participants got, the more likely they were to appreciate their personal experience influencing their interests.

Additionally, a blank box was provided below for participants to provide specific reasons or explanations concerning their interests. It is recognized that there was limitation inherent in this way of collecting participants' interest data: the limitation of gaining the interpretation from participants in questionnaire research and the challenge of gaining massive open-ended answers when close-ended answers were provided. Out of the 1,600 questionnaires distributed, only 16 participants provided answers in the blank box to elaborate on their interests.

Table 4.28 Open answers in the questionnaire provided by participants

Answers	Case
Influenced by photos, movies, television programmes, documentaries or games	4
Felt relaxation or a sense of being away from cities or pressures	3
Interested in the descriptions of nature by friends	2
Interested in the environment in daily life	2
In relation to my major in the university	1
Influenced by the report on endangered animals and plants	1
Accumulated knowledge in relation to nature	1
Good visual impact	1
Interested in growing plants	1

Table 4.28 shows the most listed answers were the modern carrier of cultural communication such as photos, movies, television programmes, documentaries, or games, which will be discussed later as an emerging theme. The benefits of experiencing nature also stimulated participants' interest in nature, which is mentioned in the table, like the feeling of relaxation, knowledge accumulation and good visual impacts. Some participants considered their interests in nature to be influenced by the surrounding people or environments.

ii) Interview results: Descriptions of childhood nature experiences

In order to further understand how personal experience contributed to their interest in nature, participants were encouraged to describe their nature experience in their childhood in the interview surveys. A total of 29 interviewees made various descriptions of their childhood nature experience and provided a description of how their unique personal experience influenced their attitudes to nature or urban natural greenspaces.

11 interviewees provided intuitive descriptions of agricultural and village landscapes.

> ***EXPO 03 (M, 18-29)*: Most are agricultural landscapes, the cultivated nature to me. I had a lot of good memories. I guess many people don't have this kind of experience. I learnt a lot about crops, fruits, and vegetables. I miss it (sceneries) so much. It hugely impacted me; even though I grew up and moved to the city, I still had an obsession with growing vegetables.**

***EXPO 11 (M, 18-29)**: I was young and short at that time. It was like walking into the forest when I got close to cropland. Because corn fields can grow up to two to three meters…… the trees and other plants over there were very dense. I was almost getting lost when I stepped into that field.*

***EXPO 07 (F, 18-29)**: I grew up in the village, so I had more chances to experience nature. My home was close to the mountains, so I sometimes climbed up. Some very interesting things are in my memory, such as climbing trees and picking wild fruit. Another deeply impressive thing is that the plants around my house were quite tall and big. I had a special feeling about these plants. After all, they were a company to grow up. Even when I was growing up to 9 or 10 years old, I still had an impression of them in a very sentimental way.*

9 interviewees described remote mountains and undeveloped areas. The words or phrases 'wild', 'deep in the mountain', and 'secluded' are used in the description to refer to scenery with a trackless wilderness and rare human intervention.

***EXPO 06 (F, 18-29)**: …there were two ravines, a waterfall in between, and a brook at the bottom. I like the sound of the brook. I used to walk on the primitive path along the brook. The path had less artificial trace and was weedy and muddy. I remember the air over there was very fresh. These are my childhood memories, and I like these scenes still.*

4 interviewees spent their childhood in urban areas. Their childhood nature experience came from botanical gardens, suburban parks or surrounding greenspace.

***EXPO 08 (M, 18-29)**: I know the greenspace in the botanical garden I just mentioned is actually part of the urban realm. And now, somehow, I do not enjoy myself when I walk inside. However, this place was natural to me when I was a child.*

***EXPO 20 (M, 18-29)**: I think I had many chances to experience nature when I was young, but…hmm, the scope was not extensive and centred around my home, mainly in the surrounding parks or greenspaces. Wait, is it nature? I guess so.*

iii) Interview results: Attitudes towards childhood nature experiences

At the time when some interviewees provided the description of their childhood nature experience, certain emotional expressions were also displayed accordingly. In addition, some interviewees were more willing to share their experiences and were also asked to evaluate their memories in the way of 'How do you feel about your experience at that time'. 7 interviewees explicitly expressed that childhood nature experience was

positive and beautiful. And 8 interviewees showed their nostalgia for past natural experiences. Their 'natural intimacy' and 'familiarity' were often emphasized in the description, which can be implicitly seen as a positive memory. Smiles, delightful and affirmative tones, and a strong sense of happiness, nostalgia, and warmth often accompanied the responses.

> ***EXPO 10 (F, 50-59): It definitely is a cherished memory because when I was a kid, I played and ran into nature as free as a bird. Nature was not managed at that time, so no one would judge you and say don't step in it. It's very freeing. (Many administrated greenspaces in Chinese cities are not allowed to be stepped on)***
>
> ***EXPO 04 (M,18-29): It was fun when I was a kid… I miss that (childhood nature experience). I could not have it (the experience) anymore in the cities.***

By contrast, one interviewee expressed a negative and unpleasant childhood experience in nature, preferring well managed and strong human interventional environment. The unpleasant memory does not rule out the activities in nature that evoked it.

> ***EXPO 12 (M,18-29): I certainly don't like that feeling because that was too tiring (he just mentioned the childhood in the village and helped out with framing). I wouldn't say I like the purely natural thing that no one manages because I'm not too fond of the natural stuff that is not serving humans.***

Two interviewees explained that no impression was left about the natural experience as they had a limited chance to experience nature.

> ***EXPO 09 (F,18-29): I think I was more indoors when I was a child and had few chances to play outside. Yeah, I had no impression.***

One of them commented further and expressed their regret for the absent childhood nature experience. She also put forward the advantages of having natural experiences for children.

> ***EXPO 19 (F, 18-29): … because my parents did not allow me…even if I was travelling in some natural space, all I just had was taking photos…it is necessary to bring the child to nature, to experience nature, to feel those little lives. Contacting with nature brings children inspiration and understanding of life's meaning…***

Three interviewees expressed that they have no apparent feelings about childhood nature experiences, with the answer like "my parents took me there …no special feeling at all". They explained that they just passively experienced nature as a child, and they felt disinterest in nature at that time.

iv) Interview results: Comparison between the nature of childhood memory and the current nature

11 interviewees perceived that the nature in their childhood was more natural than the current nature. Most interviewees perceived much more human intervention in nature or urban green space than in their childhoods. EXPO 15 seemed to appreciate the large scale of childhood nature mentioned above. Some interviewees defined the 'current nature' in the question as the green space in the urban area. It is unavoidable for them to associate 'current nature' with the surrounding environment in their daily life.

> ***EXPO 07 (F,18-29)**: In my impression, there was green everywhere with few flowers. In contrast, the flower is much more now. It seems like we are pursuing flowering for all seasons on purpose through manual intervention. When I was young, it was not as ornamental as this, which might give me a more natural feeling. The most significant difference is that what we pursue in the city right now is a strange sense of aesthetics, a bare space (no green) is not allowed, and it needs green everywhere, even in winter.*

> ***EXPO 14 (M,18-29)**: When I was kid, the natural environment would be better than now, like air or… other things…definitely better than the current natural environment. What we have now is more manmade. And that real natural place is inconvenient to go to.*

> ***EXPO 15 (M,18-29)**: The city's mountain is now well-planned, and the routes are set. Also, it is not as magnificent as my hometown's because the mountain in my hometown is on a large scale. The mountain in the city is like a small park, and it only takes you 20 to 30 min to reach the top.*

Eight interviewees attributed the change of attitude to and perception of nature to the change of their mindsets or outlooks, e.g., the growth of life experience, knowledge gaining or body shape changes. Some of them may be more concerned about dense vegetation in the green space or lose their childhood perception of the scale of nature and then consider that the current nature is less natural.

> ***EXPO 16 (F,18-29)**: Nature always surprises me, and I can never figure out what is next ... I was very small and short and shuttling through tall reeds… I miss the scene very much and hope to see it again… but I change my mind due to a subjective reason. Maybe because I grew up and learnt a lot, I will never step into these tall grass fields anymore. I am concerned there are snakes or something. It's certainly different from the idea I had as a child.*

***EXPO 17 (M,30-39)*: When I was a child, I was not afraid of insects and animals. The older I get, the more concerns I have about whether something would come out and bite me or even worry about public security issues.**

***EXPO 20 (M,18-29)*: The greenspace I used to go to was very large for me to play and run around, and I thought it was nature. But now I realise it is not that large … The intuitive impression was like the desktop wallpaper of Windows XP…but now it seems to me that it is just a pitch of greenspace or a piece of lawn, not even a park. What a huge difference from my childhood view.**

Four interviewees emphasized that in the past, material conditions were marked by backwardness and poverty. However, they conveyed that the current natural environment, with increased funding and attention on environment development, now exhibits more 'cues to care' scientific management, and improved functionalities, which they greatly appreciate.

***EXPO 01 (M,50-59)*: The environment used to be very natural and now is mainly managed and artificial, but the progress, I think, is the design of the park seems to be more reasonable, and the park also seems to be relatively clean and tidy. Anyway, I feel comfortable here, but it is not the same as some natural place.**

***EXPO 04 (M,18-29)*: It becomes more complex than the environment I had when I was a kid. There are all kinds of functions, types, and activities in the green space, and it becomes richer and more complex.**

Three interviewees emphasized the change in the structure of vegetation. EXOP 02 considered the vegetation in its current nature to be denser than in the past, while EXPO 11 had a converse feeling.

***EXPO 02 (F,18-29)*: At that time, the vegetation was not as dense as now.**

***EXPO 11 (M,18-29)*: …For example, the vegetation of the greenspace on our campus is not as dense as in my childhood. Although there are bushes under the trees, they are not densely distributed… When I was young, the trees were very luxurious. It was easy to get lost once I stepped in.**

One interviewee spent her childhood in an urban area, had few chances to experience nature, and felt there is no difference between childhood and current nature.

***EXPO 18 (F,18-29)*: It seems like the present. For example, in the spring or autumn outings, there were many flowers in the chrysanthemum exhibitions during the festivals.**

4.4. Research Question 2: How do Chinese greenspace users recognise and evaluate 'urban greenspace'?

Table 4.29 Three sub-themes consisting of questionnaire and interview results for answering research question 2

Sub-themes	Questionnaire results	Interview results
4.4.1 Thoughts on the relationship between the city and nature		▪ Definition of 'city' [all sites] ▪ Relationship between the city and nature [all sites]
4.4.2 Attitude to urban greenspaces		▪ Benefits of establishing 'nature' in cities [all sites] ▪ Difficulties of establishing 'nature' in cities [all sites] ▪ Preferred characteristics [all sites]
4.4.3.Beliefs and values related to the urban environment	▪ Beliefs and values related to the urban environment [all sites]	

4.4.1. Thoughts on the relationship between the city and nature

i) Definition of 'city'

Before delving into attitudes towards urban nature, it is crucial to examine how interviewees perceive and understand the city and the living environment in participants' everyday routines. Regarding the definition of the term 'city', three main themes emerged from the content analysis from all sites, that is 'place that embodies human civilisation and care', 'place where populations gather' and 'place that shows national/regional identity'. These themes shed light on the diverse perspectives expressed by the interviewees regarding the definitions and characteristics of cities.

11 interviewees expressed the opinion that the city, being distinct from other areas such as rural or village areas, should embody human civilization and care. They used adjective words such as 'organized', 'ordered', 'prosperous', 'planned', 'designed', 'managed' and 'disciplined' to describe their ideal vision of the city (e.g., EXPO 12 and EXPO 08).

> ***EXPO 12 (M, 18-29)*: I think a city is a place with a high level of human civilization.**

> ***EXPO 08 (M,18-29)*: City, of course, is all about order and tidiness. The streets in residential areas are divided in a very organized manner. However, that's not to say it's all strict and rigid. It's also possible to have some uncertain elements.**

Furthermore, the city, being characterized by high-density population gatherings, is expected to meet people's diverse needs, particularly in the Chinese context. Two interviewees specifically highlighted this aspect. For

instance, BM 01 emphasized the need for cities to fulfil multiple functions within limited space. Separating people too far apart, such as through large-scale greenspaces, was deemed unrealistic or inconvenient for urban dwellers.

> ***BM 01 (M, above 70)*: The city has a large population. People need to gather together because humans, especially Chinese people, enjoy living in communities. People need to live, go to school, and work, so it's not feasible to be too far apart in the city.**

Additionally, one interviewee (e.g., BM 02) emphasized the significance and uniqueness of Beijing, the capital city of China. They highlighted that Beijing holds the capacity to showcase the national image of China to both domestic and international audiences.

> ***BM 02 (M, 18-29)*: The city has its own purpose, especially (Beijing), our capital city. It serves as an economic, political and cultural centre. It must possess the functions of a capital..... Because the city environment represents its 'façade'. The cityscape needs to be maintained, as it should be presentable to the outside world.**

ii) Relationship between the city and nature

Based on the understanding of the definition of a city identified by some interviewees, a further dichotomous question regarding the relationship between a human-oriented city and nature was introduced. The potential answers were 'mixed' and 'separate', and the interviewees were asked to provide explanations for their chosen responses. In total, 19 interviewees agreed that cities should blend with nature, while 9 interviewees believed that cities and nature should exist independently.

Regarding the response of 'city mixed with nature', the main reasons mentioned by interviewees include the richness of scenery (e.g., BM 10), the restorative effect (e.g., EXPO 09), and the convenience it offers in daily life (e.g., LLP 10, LLP 09, and LLP 11).

> ***BM 10 (F, 18-29)*: Because cities can often feel monotonous and tedious, nature can greatly enhance the overall experience.**

> ***EXPO 09 (F, 18-29)*: In the city, sometimes all you need is to see greenery and get that sense of vitality, which can greatly uplift your mood.**

> ***LLP 10 (M, 60-69)*: Because human activities in the city are limited compared to the vastness of nature. For people like me, retired, and I can go to visit nature at any time I want…… However, most people cannot frequently escape to the great outdoors. They rely on the city for work,**

livelihood, and raising their children……Urban parks are what can be closely connected to their lives—the places that city residents may frequently visit.

LLP 09 (M, 30-39): It's not feasible for everyone to spend three hours every day travelling to nature. Having such natural scenery nearby after-dinner certainly benefits the satisfaction level of the city.

LLP 11 (M, 40-49): One of the advantages of incorporating nature within the city is convenience. It allows people to enjoy natural surroundings easily and quickly without extensive travel. Additionally, it can enhance the overall design quality of the city. It can contribute to improving the aesthetics and liveability of the urban space, ultimately benefiting the city's overall living standards.

Some interviewees, like BM 05, expressed appreciation for the blend of nature and urban areas in other countries and expressed a desire to see a similar integration in China.

BM 05 (F, 18-29): That's right, the integration of nature and the city is essential. In fact, if you go abroad, you will see that in many places like Australia and Singapore, they have achieved a seamless blend of nature and urban areas. They have achieved a balance where even a high-rise building might have a roof garden filled with various flora and fauna.

Another response is that 'city and nature should be separated'. 9 interviewees who held this view believed that cities and nature serve different functions and that individuals should have the choice to access each according to their needs. They also highlighted that cities and nature have different priorities and mixing them could potentially lead to inefficiency (e.g., EXPO 17 and LLP 05). One interviewee, BM 02, even provided an ideal distance between cities and nature as a way to maintain their separation.

EXPO 17 (M, 30-39): Because urban development requires a significant amount of land, I personally do not wish to see small pockets of nature within the city. I believe that nature should be preserved outside the city, in the wilderness, while the city itself should focus on proper urban development.

LLP 05 (M, 18-29): Because urban development prioritizes efficiency. Having natural landscapes in the city, hmm, has aesthetic benefits, and may not be a significant factor in the city's development. Therefore, I believe it is entirely feasible to separate (nature from the city) and allocate distinct functions. The rural areas can fulfil their role of providing natural landscapes, while the city centre can serve as the engine driving urban development.

***BM 02 (M, 18-29)*: If you want to see nature, you can go out and head to the countryside. KC: How far is considered appropriate? BM02: A drive of one to two hours would be suitable.**

4.4.2. Attitude to urban nature

A total of 42 interviewees responded to the question regarding their attitude towards urban nature. The term 'urban nature' referred to descriptions provided by the interviewees themselves when discussing questions about nature and their experiences with it during childhood. In cases where no specific descriptions were given, the term 'natural woodland' was used in the question.

19 interviewees expressed a clear positive attitude, using affirmative language such as 'willing', 'happy', and 'supportive' when discussing the presence of nature in cities. Furthermore, some interviewees provided explanations highlighting the benefits of urban nature. On the other hand, only two interviewees unequivocally rejected the idea of establishing nature in cities, as they believed nature should be kept separate from urban areas. The remaining 21 interviewees displayed a wavering attitude, with some not indicating a preference, while others expressed both positive attitudes and concerns regarding the challenges of implementation. The following section presents their specific benefits and concerns.

i) Benefits of establishing 'nature' in cities

In general, four themes can be summarised from the qualitative analysis, as outlined below (Table 4.30). The majority of interviewees acknowledged the psychological and ecological benefits of urban nature, while only a few individuals mentioned other aspects.

Table 4.30 Summary of themes discussing the benefits of establishing nature in cities

Themes	Case	Examples of specific reasons
Psychological benefits	13	Relaxation and reduce pressure
Ecological benefits	12	Improve air quality and support wildlife
Physical benefits	3	Have space for physical activities
Economic benefits	1	Increase housing price

The interviewees predominantly valued the psychological advantages of urban nature, often using terms like 'mental' and 'psychological' in their responses. They frequently expressed sensations of being 'comfortable', 'less stressed', 'free' and 'relaxed' when discussing their emotional states. Additionally, they highlighted that novel and refreshing experiences in nature contributed to their feelings of relaxation. EXPO 13 stood out as she mentioned her fondness for plants and possessing professional knowledge in the field.

> ***EXPO 13 (F, 18-29)*: Through such beautiful landscapes, I feel like the pressure is reduced, and there's a sense of relaxation. It's similar to the concept of horticultural therapy. I believe that nature has a healing effect, and regular contact with nature provides a relaxed feeling.**

Ten interviewees mentioned the ecological benefits of urban nature, particularly in relation to improving air quality. Specifically, nine interviewees clearly and decisively highlighted the benefits of air purification. (e.g., EXPO 13), often emphasizing that air pollution is a key issue in Beijing at the same time. Additionally, the attraction of birds and the mitigation of flooding were also mentioned as notable ecological benefits (e.g., LLP 12 and EXPO 07).

> ***EXPO 13 (F, 18-29)*: It can purify the air, alleviate noise pollution, regulate urban microclimate, and provide urban green spaces for people.**

> ***LLP 12 (M, 60-60)*: it can also attract various bird species and introduce them into the city environment.**

> ***EXPO 07 (F, 18-29)*: it can help mitigate issues like flooding as well if there is a focus on urban afforestation.**

Three interviewees expressed appreciation for the physical benefits of urban nature, specifically mentioning activities such as exercising and participating in public square dancing, which is a popular collective dance form with gymnastics in the Chinese context.

> ***EXPO 09 (F, 18-29)*: Urban parks serve as places for relaxation and activities. People can engage in various activities such as walking, exercising, public-square-dancing, or enjoying family time in these spaces.**

Interestingly, only one interviewee raised the topic of economic benefits, specifically discussing the impact of urban nature on surrounding housing prices rather than focusing on the benefits directly associated with urban nature itself.

> ***LLP 11 (M, 40-49)*: it also contributes to enhancing the overall quality of the city itself. In terms of real estate, it can indeed have a positive impact on property prices and promote the real estate market.**

ii) Difficulties of establishing 'nature' in cities

The qualitative analysis of the interviews revealed several prominent themes, as presented in Table 4.31. The interviewees expressed widespread concerns regarding the scale, cost, resource competition, and compatibility of establishing urban nature. Additionally, there were concerns about public acceptance and aesthetics, the absence of cultural symbols, national power, and identity, as well as concerns about wildlife.

Table 4.31 Summary of themes discussing the challenges and concerns about establishing nature in cities

Themes	Case
Hard to achieve large scale, high cost, extensive resource competition and low compatibility	17
Concerns about public acceptance and aesthetics	5
Lacking cultural symbols, national power, and identity	5
Concerns about wildlife may harm people and hard to administration	5
Geographical limitations	3
Large population in cities disrupts the natural feeling	2
Urban nature and wildlife may be disturbed by human activities	2
Long-term nature establishment may go against rapid urban development	1
Urban pollution disrupts the natural feeling	1

The first theme emerged as the most significant to the interviewees, with 17 of them specifically mentioning it. This theme is complex and interrelated, involving several sub-themes including scale, cost, resource competition, and compatibility. These sub-themes all relate to the establishment of urban nature and primarily reflect the physical relationship between nature greenspace and urban areas.

Interviewees who emphasized the scale of urban nature, expressed concerns about the difficulty of achieving urban nature in a large-scale manner. They worried that the extent of urban nature may not be substantial enough to truly be considered as 'nature' (e.g., LLP 14 and BM 07). This finding aligns with the results discussed in the previous section about the definition of nature.

> ***LLP 14 (M, 60-69): It also depends on the size of the space. If the green space is too small, it may feel a bit underwhelming. If you want a natural and wild atmosphere, a small space may not be ideal, but a larger space would be more suitable for creating that wild and natural ambience.***

> ***BM 07 (F, 40-49): If you are in the city, how can you go about seeing distant mountains or reaching higher elevations?***

Furthermore, the establishment of urban nature in urban areas, particularly in cities like Beijing, may incur high costs. Several interviewees expressed that the expensive land prices and low potential profits were key factors making it challenging to establish nature within urban environments (e.g., BM 03, BM 05 and EXPO 09).

***BM 03 (M, 50-59)*: (natural environment) It fits the urban context, but it will be very hard to achieve… (sigh)… the city is almost developed with prices per square meter reaching around 70,000 to 80,000 CYN.**

***BM 05 (F,18-29)*: In reality, cities have certain limitations. For instance, due to economic development, vast expanses of land cannot be transformed into natural landscapes that have no direct economic benefits. Instead, they are utilized for buildings, schools, hospitals, and other structures to maximize profit and utility.**

***EXPO 09 (F, 18-29)*: It depends on the value of time and money. I am currently unsure of how to determine the value. However, I believe that if the cost becomes excessively high, establishing nature (in cities) may not be necessary.**

Similarly, the establishment of urban nature can result in the displacement of general urban functional lands, particularly the large-scale nature. This challenge becomes more pronounced in city areas with high population densities. Thus, many interviewees expressed concerns about resource competition and low compatibility of urban nature within such contexts (e.g., EXPO 11 and BM 01).

***EXPO 11 (M, 18-29)*: Why don't I just relocate that piece of land, which could have been used for building, to a place far away from the city instead of insisting on keeping it within the city and turning it into green space? Is it solely for the purpose of absorbing carbon dioxide and releasing oxygen?**

***BM 01 (M, above 70)*: If it's a large city, it is not feasible, but for medium-sized and small cities, it is possible to create nature in urban. This is more common in foreign countries, but in China, it is challenging because of the large population. It is difficult to achieve in China due to the high population density. Unlike those other countries with fewer people and cars in the cities…… Chinese people tend to prefer living in close proximity to one another.**

Five participants emphasized that neat and orderly greenspaces are widely accepted by Chinese greenspace users. However, they pointed out that the use of natural greenspaces characterized by disordered-patterned and unpruned vegetation in urban areas poses challenges in terms of public nature aesthetics (e.g., BM 10 and EXPO 18).

***BM 10 (F, 18-29)*: Because we are accustomed to seeing neatly trimmed trees in the city.**

***EXPO 18 (F, 18-29)*: It could be a deeply ingrained perception because urban landscapes have been portrayed in a certain way in Picture 3 (showing the mown grass in the TP) for many years.**

As a result, people have developed a fixed belief that parks should consist of neatly manicured lawns, hedges, and organized groupings borders. This fixed feeling makes Picture 2 (showing the naturalistic planting in NSR) appear more like a wild or natural state.

Cultural symbols and values are also regarded as important factors in urban parks. It is essential for the planting in parks to align with the park's themes (e.g., BM 10 and BM 04). For example, in Lotus Lake Park, the predominant species should be lotus throughout the entire park. In addition, while EXPO 05 mentioned the concept of the 'façade of a city', other interviewees referred to the use of 'national day flower beds' as examples, which often feature exaggerated patterned plantings or well-trimmed green sculptures. This implies that natural greenspaces may not effectively convey the desired sense of Chinese national power and identity, especially in the capital city of Beijing.

BM 10 (F, 18-29): The natural elements within the city should align with the theme and planning of the park.

BM 04 (F, 40-49): Because this type of natural landscape is suitable in rural and mountainous areas, it harmonizes well with the surrounding environment. However, once we enter the urban areas, a more horticultural and culturally influenced landscape feels more appropriate.

EXPO 05 (F, 18-29): The road landscape is considered the 'façade of a city' because it is the first thing visitors see when they arrive. Therefore, both the government and the citizens, including the residents, aspire to maintain a neat and visually appealing state for the road landscape.

Furthermore, the interviewees expressed concerns about various aspects related to the establishment of urban nature. They were worried that the presence of natural environments might attract wildlife such as bees and snakes, posing potential risks to people, particularly young children. Additionally, managing and controlling wildlife within urban areas was seen as challenging. Geographical limitations, including topographic conditions and altitudes, were identified as additional reasons that could affect the establishment of urban nature. The large population in cities was seen as disruptive to the desired sense of natural, quiet, and secluded tranquillity (e.g., LLP 06). Interviewees also pointed out that human activities could disturb urban nature and wildlife, potentially leading to negative impacts on their habitats. Moreover, there was a concern that long-term nature establishment efforts could conflict with the rapid pace of urban development, creating a potential imbalance. The conflict between long-term nature establishment and rapid urban development was noted as a potential challenge (e.g., BM 02). Lastly, urban pollution such as car exhaust was seen as a disruptor of the natural atmosphere, inhibiting the desired sense of naturalness in urban environments.

***LLP 06 (M, 40-49)*: there are too many people now. And it disrupts the natural atmosphere. Despite everyone having the right to enjoy these views, it can indeed affect the overall natural ambience (in cities).**

***BM 02 (M, 18-29)*: For example, to establish such a natural landscape, it would take a minimum of five to ten years, so the time frame would be quite long. Additionally, there may be some deviations from the overall functional planning of the city.**

iii) Preferred characteristics of urban greenspace

Before inquiring about the interviewees' attitudes towards specific surveyed plantings or presenting any picture for online interviews, a general question was posed to gain their overall preference for urban greenspace from all sites. By analysing the descriptions of urban greenspace provided by the interviewees, the preferred characteristics and elements that define an ideal greenspace can be derived, which is shown in Table 4.32.

Table 4.32 Preferred characteristics and features of urban greenspace

Preferred characteristics of urban greenspace	Case/frequency
Ordered-looking/not-too-natural-looking	9
Necessary maintenance on plants	8
Vegetation species richness and biodiversity	6
Less vegetation species richness	3
Seasonal interests	3
Waterbody	3
Topographic changes	3
Various looking	3
Flat paths	3
Using native species	2
Stable vegetation communities	2
Wildlife	2
Fresh-feeling	2
Culture values	2
Opened	2
Well-fit in the surrounding context	2
Flowers	1
Safe	1
Relative infrastructure such as toilets and bins	1
Able to reduce noise	1
Fewer paths	1

Some characteristics were identified in relation to the appearance and structure of vegetation, while other preferred elements were related to general greenspace features and infrastructure. Overall, Nine interviewees

mentioned that they prefer vegetation that appeared neat, organized, and not overly natural. They used descriptors such as 'tidy', 'organised', 'not messy', 'not too natural' and 'like mown grass' to describe their preferences for the appearance of vegetation. The second preferred characteristic was the need for regular maintenance of plants (eight interviewees). This included activities such as pruning, removing dead trunks, and ensuring that the vegetation was kept in a well-maintained condition. While some interviewees mentioned the importance of species richness and biodiversity for visual impacts and ecological benefits (six interviewees), others held the opposite view (three interviewees). They preferred less species richness, as they believed that a higher number of species would result in a messy and dense appearance. The rest preferred characteristics and elements will be discussed with specific planting designs in the subsequent sections.

4.4.3. Beliefs and values related to the urban environment

A set of questions regarding participants' beliefs and values concerning the urban environment was posed across all sites. Table 4.33 below displays the mean scores and site-based statistic differences.

Table 4.33 Mean and ANOVA results of questions about beliefs and values related to the urban environment

Sources of interest in nature	Mean	N	Variance explained [a]
It is important to have natural vegetation and wildlife in cities.	4.24	1400	1.4%
The more types of species in planting, the more valuable it is as a wildlife habitat.	3.92	1600	13.4%
Human-induced climate change is happening.	4.40	1400	0.9%[b]
Protecting the environment is as important as economic development.	4.67	1400	--
Natural urban woodland can help reduce carbon emissions more than conventional ornamental gardens.	4.42	600	--
It is possible to design and create something approximating to real nature in the city.	3.98	800	11.8%

[a] The mean difference among 5 research sites, using Tukey HSD. % provided with P < 0.001. Number in red: medium effect size, ηp2 > 0.06. --: P > 0.050, not significant.

[b] % provided with P < 0.005

The data reveals a consistent agreement among most participants that 'Protecting the environment is as important as economic development', with the highest mean score across all survey sites. Notably, participants surveyed at the EXPO show gardens, including the naturalistic planting in the NSR and conventional planting in the BG, displayed significantly lower levels of belief in statements such as 'It is important to have natural vegetation and wildlife in cities' and 'The more types of species in planting, the more valuable it is as a wildlife habitat' compared to participants from the nature reserve and urban parks. Regarding the belief in the possibility of designing and creating environments resembling real nature in the city, participants from the naturalistic planting in an urban park (WP) expressed significantly higher levels compared to those surveyed in real nature at BM. In terms of beliefs about climate change, participants from the naturalistic planting in show gardens (NSR) were more likely to agree that human-induced climate change is occurring compared to participants from the naturalistic planting in urban parks (WP).

Additionally, to explore potential differences among various socio-demographic groups regarding participants' beliefs and values concerning the urban environment, a Principal Component Analysis (PCA) was conducted. This analysis involved only the sample from urban parks (LLP, n=600), as certain questions were not asked in other sites (i.e., nature reserve and EXPO). Table 4.34 presents the identified components of 'beliefs and values related to the urban environment' derived through PCA, along with the loadings of each item.

Table 4.34 The loading of environmental paradigm variables onto specific factors (N=600)

	Component loading		Eigenvalue	Variance
	1	2		
Component 1: Environmental sustainability			2.386	39.765%
Human-induced climate change is happening	0.788			
Protecting the environment is as important as economic development	0.777			
It is possible to design and create something approximating real nature in the city	0.532	0.421		
Component 2: Biodiversity conservation			1.060	17.667%
The more types of species in planting, the more valuable it is as a wildlife habitat		0.865		
Natural urban woodland can help reduce carbon emissions more than conventional ornamental gardens.	0.401	0.687		
It is important to have natural vegetation and wildlife in cities.		0.510		
Components 1 and 2 accounted for 57.432% of the total variance.				
KMO= 0.746, Bartlett's test of Sphericity Sig < 0.001				

The first component was named 'environmental sustainability' which consisted of the related questions listed in the table above, including climate change, balancing economic development with environmental protection, and designing cities to be more environmentally friendly. The second component was named 'biodiversity conservation'. The questions all touch on the importance of preserving and promoting biodiversity in urban environments and its potential benefits, such as reducing carbon emissions and providing habitats for wildlife.

Table 4.35 Effect of the background and socio-demographic variables on the environmental paradigm components

	Component 1 Environmental sustainability				**Component 2 Biodiversity conservation**			
	F	*df*	*p*	*VE* [a]	*F*	*df*	*p*	*VE*
Demographic variables								
Gender	--	--	NS [b]	--	--	--	NS	--
Age	--	--	NS	--	--	--	NS	--
Education	9.011	3, 596	< 0.001	4.3%	--	--	NS	--
Employment	--	--	NS	--	--	--	NS	--
Income	3.281	4, 595	0.011	2.2%	--	--	NS	--
Occupation	--	--	NS	--	--	--	NS	--
Religion	--	--	NS	--	--	--	NS	--
Place for growth	--	--	NS	--	--	--	NS	--
Place of living	--	--	NS	--	--	--	NS	--
Pattern of living	--	--	NS	--	--	--	NS	--

[a] VE = Variance Explained.

[b] NS indicates not significant at the 95% level.

Table 4.35 presents the significant differences observed in responses towards environmental sustainability among different educational qualifications and income groups. Participants with a high school education or lower displayed less consideration for environmental sustainability compared to those with higher educational qualification levels. Additionally, participants with lower incomes demonstrated fewer positive attitudes towards environmental sustainability compared to those with higher incomes or students. However, no statistically significant differences were found between socio-demographic groups in terms of attitudes towards biodiversity conservation components.

Table 4.36 Correlation between the environmental paradigm component and NR-6, interests, and background variables

	Component 1 Environmental sustainability		Component 2 Biodiversity conservation	
	p	*r*	*p*	*r*
Pearson's correlation				
NR-6 mean score	< 0.001	0.405	< 0.001	0.464
Interests- Traditional Chinese Culture	0.006	0.111	< 0.001	0.311
Interests- Personal experience	< 0.001	0.307	< 0.001	0.290
Spearman's rank correlation				
Childhood nature experience	< 0.001	0.345	< 0.001	0.317
Prefer geometric planting patten	0.007	0.109	< 0.001	0.224

Table 4.36 displays the correlations between the 'environment-related thoughts' components and variables such as NR-6 scores, interest in nature, and participants' background variables. The findings reveal that participants with higher NR-6 scores or greater interest in nature influenced by traditional Chinese culture and personal experience exhibited more positive attitudes towards both environmental sustainability and biodiversity conservation components.

Furthermore, participants who had childhood experiences in nature and a preference for geometric planting patterns demonstrated a positive influence on their attitudes towards environmental sustainability and biodiversity conservation. Those who had more exposure to nature during their childhood were more likely to exhibit positive responses to environmental sustainability and biodiversity conservation compared to those with limited childhood nature experiences. Interestingly, participants who expressed a preference for geometric-organized planting patterns showed a greater understanding of the importance of environmental sustainability and biodiversity conservation.

4.5. Research Question 3: How do greenspace users perceive naturalistic planting in urban areas?

Table 4.37 Four sub-themes consisting of questionnaire and interview results for answering the research question 3

Sub-themes	Questionnaire results	Interview results
4.5.1 Comparison between NP and CP in urban park scale	▪ Perceptions of vegetation in urban parks [LLP] ▪ Overall impression score on vegetation in urban parks [LLP]	▪ Comparison between NP and CP [LLP]
4.5.2 Comparison between NP and CP in designed show garden scale	▪ Perceptions of vegetation in show gardens [EXPO] ▪ Overall impression score on vegetation in show gardens [EXPO] ▪ The most and least favoured aspects of plantings [EXPO]	▪ Comparison between images of real nature, NP and CP [EXPO]
4.5.3 Comparison between real nature and NP in urban parks and show gardens	▪ Comparison between real nature, NP in urban parks and show gardens [BM, WP and NSR]	
4.5.4 Perceived and preferred characteristics of NP	▪ Naturalness and restorativeness ▪ Messiness and disorder/tidiness and order ▪ Structure and pattern ▪ Visual impact and seasonal interests ▪ Ecological benefits and wildlife ▪ Emerging themes: location and cultural-relatedness [all sites]	▪ Description and definition of each characteristic [all sites]

This section is divided into four sub-themes, derived from the results of questionnaires and interviews (Table 4.37). These sub-themes include a comparison between **Naturalistic Planting (NP) and Conventional Planting (CP)** in urban parks (Lotus Lake Park, LLP) and designed show gardens (EXPO), a comparison between real nature in Baihua Mountain National Nature Reserve (BM) and NP on different scales in Woodland Park (WP) and 'New Silk Road' Garden (NSR), and an exploration of the perceived and preferred characteristics of NP.

4.5.1. Comparison between naturalistic (NP) and conventional plantings (CP) in urban park scale

i) Questionnaire results: Perceptions of vegetation in urban parks

To understand whether the public's attitudes towards these two types of plantings were perceived in the urban area differently in Lotus Lake Park (LLP) and to explore attitude differences between the demographic groups, the PCA test was first carried out to condense the dimensions from a series of questions related to public perception to four perceptual factors. Then, one-way ANOVA was conducted to find the groups that had existing differences. Post hoc comparisons using the Tukey test and LSD test were subsequently carried out to detect the specific differences within the groups. The background variables, which came from the general questions for both NP in **Woodland Park (WP)** and CP in **Traditional Park (TP)**, were put together and analysed

in a 600-questionnaire sample size. While in terms of the specific attitudinal variables to the planting, it was analysed separately by the planting types.

Table 4.38 The loading of individual attitudinal variables onto specific factors

	Component loading				Eigenvalue	Variance
	1	2	3	4		
Component 1: Attractiveness and restorativeness					4.534	28.338%
Attractive	0.841					
Colourful	0.831					
Natural	0.704					
Peaceful and relaxed	0.688	0.310				
Designed well	0.532	0.467				
Component 2: Ecological value, familiarity, and policy fitness					2.303	14.393%
Costs less money		0.718				
Familiar		0.580				
Fits well with policies	0.456	0.572				
Supports more species of animals	0.371	0.554				
Be happy to see more planting like this	0.410	0.471				
Component 3: Complexity and disorder					1.277	7.984%
Denser			0.779			
Complex			0.717			
Messier	-0.390		0.636			
Less cared for	-0.380		0.516			
Component 4: Insecurity					1.193	7.459%
Feel unsafe				0.852		
Concerns about not seeing through vegetation				0.831		
Components 1-4 accounted for 58.173% of the total variance.						

KMO= 0.838, Bartlett's test of Sphericity Sig < 0.001

The names of each individual perceptual component derived from the PCA analysis and the loadings of each item can be found in Table 4.38 above.

Table 4.39 below presents the effect of the plantings and seasons variables on the perceptual factors through a t-test or one-way ANOVA (n = 600). There was a statistically significant difference at the $p < 0.001$ level in the factor of perceived attractiveness and restorativeness for the NP and CP regarding types and species diversity. Strong evidence shows that people perceived more attractiveness and restorativeness from the NP than the CP, especially in the summer landscape. In terms of the percentage of vegetation surface that is not green, with 50% -80% vegetation in autumn NP landscape was perceived as having the most attractiveness and restorativeness, which is significantly different from others ($p < 0.001$). Whereas 50% -80% of vegetation that is not green also perceived more insecurity, compared to the vegetation with 5%-20% not green ($p = 0.042$). No significant difference can be found for planting and season variables on the rest perceptual factors.

Table 4.39 Effect of the plantings, seasons variables on the perceptual components

	Component 1 Attractiveness and restorativeness				Component 2 Ecological value, familiarity, and policy fitness				Component 3 Complexity and disorder				Component 4 Insecurity			
	F	*df*	*p*	*VE* [a]	*F*	*df*	*p*	*VE*	*F*	*df*	*p*	*VE*	*F*	*df*	*p*	*VE*
Planting: NP vs CP	79.652	1, 598	< 0.001	11.8%	--	--	NS	--	--	--	NS	--	--	--	NS	--
Season: Summer vs Autumn	--	--	NS[b]	--	--	--	NS	--	--	--	NS	--	--	--	NS	--
Planting * Season	32.442	3, 596	< 0.001	14.0%	--	--	NS	--	--	--	NS	--	--	--	NS	--
% of not-green-area	12.118	2, 597	< 0.001	3.9%	--	--	NS	--	--	--	NS	--	3.051	2, 597	0.048	1.0%

[a] Variance explained. [b] NS indicates not significant at the 95% level.

Table 4.40 Effect of the background and socio-demographic variables on the perceptual components in the Naturalistic Planting (NP) in WP (N=400)

Naturalistic Planting	Component 1: Attractiveness and restorativeness				Component 2: Ecological value, familiarity, and policy fitness				Component 3: Complexity and disorder				Component 4: Insecurity			
	F	*df*	*p*	*VE* [a]	*F*	*df*	*p*	*VE*	*F*	*df*	*p*	*VE*	*F*	*df*	*p*	*VE*
Background variables																
Childhood experience	--	--	NS[b]	--	5.587	2, 397	0.004	2.7%	--	--	NS	--	5.371	2, 397	0.005	2.6%
Like geometric rather than random	--	--	NS	--	8.062	2, 397	< 0.001	3.9%	--	--	NS	--	7.895	2, 397	< 0.001	3.8%
Demographic variables																
Gender	--	--	NS	--	--	--	NS	--	--	--	NS	--	--	--	NS	--
Age	--	--	NS	--	--	--	NS	--	4.261	5, 394	< 0.001	5.1%	--	--	NS	--
Education	--	--	NS	--	--	--	NS	--	5.763	3, 396	< 0.001	4.2%	--	--	NS	--
Employment	--	--	NS	--	--	--	NS	--	2.961	6, 393	0.008	4.3%	--	--	NS	--
Income	--	--	NS	--	--	--	NS	--	--	--	NS	--	--	--	NS	--
Occupation	--	--	NS	--	--	--	NS	--	6.066	4, 395	< 0.001	5.8%	--	--	NS	--
Religion	--	--	NS	--	--	--	NS	--	--	--	NS	--	--	--	NS	--
Place for growth	--	--	NS	--	--	--	NS	--	--	--	NS	--	--	--	NS	--
Place of living	--	--	NS	--	--	--	NS	--	--	--	NS	--	--	--	NS	--
Pattern of living	--	--	NS	--	--	--	NS	--	--	--	NS	--	--	--	NS	--

[a] Variance explained. [b] NS indicates not significant at the 95% level.

Table 4.41 Effect of the background and socio-demographic variables on the perceptual components of Conventional Planting (CP) in TP (N=200)

Conventional Planting	Component 1 Attractiveness and restorativeness				Component 2 Ecological value, familiarity, and policy fitness				Component 3 Complexity and disorder				Component 4 Insecurity			
	F	*df*	*p*	*VE* [a]	*F*	*df*	*p*	*VE*	*F*	*df*	*p*	*VE*	*F*	*df*	*p*	*VE*
Background variables																
Childhood experience	--	--	NS[b]	--	3.565	2, 197	0.035	3.5%	--	--	NS	--	--	--	NS	--
Like geometric rather than random	4.918	2, 197	0.008	4.8%	12.499	2, 197	< 0.001	11.3%	--	--	NS	--	11.131	2, 197	< 0.001	10.2%
Demographic variables																
Gender	--	--	NS	--	--	--	NS	--	--	--	NS	--	--	--	NS	--
Age	--	--	NS	--	--	--	NS	--		--	NS	--	5.399	5, 194	< 0.001	12.2%
Education	--	--	NS	--	--	--	NS	--		--	NS	--	--	--	NS	--
Employment	--	--	NS	--	--	--	NS	--	--	--	NS	--	3.048	6, 193	0.007	8.7%
Income	--	--	NS	--	--	--	NS	--	--	--	NS	--	--	--	NS	--
Occupation	--	--	NS	--	--	--	NS	--	--	--	NS	--	--	--	NS	--
Religion	--	--	NS	--	--	--	NS	--	--	--	NS	--	--	--	NS	--
Place for growth	--	--	NS	--	--	--	NS	--	--	--	NS	--	--	--	NS	--
Place of living	2.748	5, 194	0.020	6.6%	--	--	NS	--	--	--	NS	--	--	--	NS	--
Pattern of living	--	--	NS	--	--	--	NS	--	--	--	NS	--	--	--	NS	--

[a] Variance explained.
[b] NS indicates not significant at the 95% level.

Perceptions of Naturalistic Planting (NP) in urban parks

Table 4.40 above shows the effect of the background and socio-demographic variables on the perceptual factors in the NP. It can be seen from the table that there was no statistically significant difference between demographic background variables on the component of attractiveness and restorativeness of the NP.

As regards the perception of 'ecological value, familiarity, and policy fitness', there is a significant difference between the group of whether they had childhood experience in nature and whether they liked geometric rather than random. Participants who had more experience in nature in their childhood were able to perceive more ecological values, familiarity, and polity fitness of the NP than those with less experience. Meanwhile, participants who like geometric-organized patterns were more likely to perceive planting's ecological values, familiarity, and polity fitness than those fond of the random-organized pattern.

In the perception of complexity and disorder, there was a statistically significant difference in socio-demographic groups of age, education, employment, and occupation. Young participants tended to perceive the complexity and disorder of the NP more than older participants; Likewise, the higher educated participants, full-time employed participants, self-employed participants, and students tend to perceive more sense of complexity and disorder of the NP. Participants whose occupation or study related to biological discipline and natural environment and creative practice and design were able to perceive significantly more complexity and disorder of planting than those related to engineering and physical science, finance and management and others.

The significant difference between the groups of 'childhood experience in nature' and 'fond of geometric patterns rather than random' can be found in the perception of insecurity. Participants who considered themselves to have less childhood experience in nature perceived less insecurity of planting than those who had more experience regarding the NP. In the case of participants' preferred planting patterns, those who preferred random patterns perceived significantly less insecurity from the NP than those who preferred geometric patterns.

Overall, the significant difference between the demographic groups only can be found in the factor of 'perceived complexity and disorder', and the result indicated that young, well-educated, employed participants, environment-related or design-related practitioners were more likely to observe and perceive the NP's complexed structure and design. In contrast, elderly, low-educated, retired participants or non-environment-related practitioners were likely to perceive less complexity and disorder or a high tolerance for NP. People who used to have experience in nature in their childhood could recognise the plantings' ecological values and more familiarity and polity fitness of the NP. Meanwhile, people with less natural experience in the past did not lead

to more perception of insecurity caused by NP. The findings also indicated that participants who like geometric-organized planting could still find out the ecological values, familiarity, and fitness of the NP in the urban park. On the other hand, the participants who like random planting had less fear and insecurity caused by the planting as they might have a high acceptance of wild-looking planting.

Perceptions of Conventional Planting (CP) in urban parks

Table 4.41 above shows the effect of the seasons, personal traits, and background variables on the perceptual factors in the CP. Participants who had a neutral attitude to geometric or random planting patterns tended to perceive less attractiveness and restorativeness from the CP than those who preferred geometric planting patterns; meanwhile, the participants who were living in the first-tier cities perceived significantly less attractiveness and restorativeness in the CP than those living in third-tier cities.

Similar to the NP results, participants who had more chance to contact nature in childhood tended to perceive more ecological values, familiarity, and policy fitness than those who had less experience. Unlike the NP, participants who had a neutral attitude on planting patterns tended to perceive less ecological values, familiarity, and policy fitness from the CP than those who preferred geometric planting patterns.

No statistically significant difference can be found between background and demographic background variables on the perception of complexity and disorder of the CP.

In the perception of insecurity, there was a statistically significant difference in background groups of ‘preferred planting patterns’ and socio-demographic groups of age and employment. Participants who preferred random planting patterns seemed to perceive less insecurity than those who preferred geometric planting patterns. The participants aged 18-29 years old were more likely to perceive insecurity from the CP than those aged 50-69. Meanwhile, retired participants perceived less insecurity from the CP than full-time employed and part-time employed participants.

To sum up, the CP was less attractive and restorative for the first-tier cities’ citizens. In addition, the older and retired participants tend to have less insecurity from the planting as they might be frequent park users. Participants who had more childhood experiences in nature demonstrated a stronger ability to recognize the ecological values of the CP in urban parks. They also exhibited a greater sense of familiarity with and perceived alignment of the planting with relevant environmental policies. People who prefer the random pattern in the planting can perceive less attractiveness and restorativeness from the CP, less ecological values, familiarity, and policy fitness, and less insecurity from the plantings.

ii) Questionnaire results: Overall impression score on vegetation in urban parks

Table 4.42 The effect of the planting and seasons variables on participants' overall impression scores

	Overall impression scores on vegetation (N=600)			
	F	*df*	*p*	*VE* [a]
Planting and season variables				
Planting: NP vs CP	29.361	1, 598	P < 0.001	4.7%
Season: Summer vs. Autumn	7.376	1, 598	0.007	1.2%
Planting * Season	13.798	3, 596	P < 0.001	6.5%
% of not-green-area	--	--	NS[b]	--

[a] Variance explained.
[b] NS indicates not significant at the 95% level.

Table 4.42 illustrates that there is a significant difference in the overall impression of vegetation in urban parks. The overall score for the NP (m = 8.65, n = 400) was significantly higher than the CP (m = 8.02, n = 200). Additionally, the overall score for both NP and CP in summer (m = 8.59, n = 300) was significantly higher than in autumn (m = 8.29, n = 300). Moreover, a significant difference was found between the groups with combined planting types and seasons. The overall score for CP in autumn (m = 7.71, n = 100) was significantly lower than the outcome for summer-NP (m = 8.73, n = 200, p < 0.001), autumn-NP (m = 8.57, n = 200, p < 0.001), and summer-CP (m = 8.32, n = 100, p = 0.008). However, no statistically significant difference was found between the overall impression score and the percentage of non-green vegetation surface.

Table 4.43 The effect of the background and demographic variables on participants' overall impression scores for the NP and CP

	NP's Overall score (N=400)				CP's Overall score (N=200)			
	F	*df*	*p*	*VE* [a]	*F*	*df*	*p*	*VE*
Background variables								
Childhood experience in nature	--	--	NS [b]	--	--	--	NS	--
like geometric rather than random	10.029	2, 397	P < 0.001	4.8%	--	--	NS	--
Demographic variables								
Gender	--	--	NS	--	--	--	NS	--
Age	2.916	5, 394	0.013	3.6%	3.205	5, 194	0.008	7.6%
Education	4.320	3, 396	0.005	3.2%	3.825	3, 196	0.011	5.5%
Employment	--	--	NS	--	--	--	NS	--
Income	2.227	6, 393	0.040	3.3%	3.157	6, 193	0.006	8.9%
Occupation	3.413	4, 395	0.009	3.3%	--	--	NS	--
Religion	--	--	NS	--	--	--	NS	--
Place for growth	--	--	NS	--	--	--	NS	--
Place of living	--	--	NS	--	4.218	5, 194	0.001	9.8%
Pattern of living	--	--	NS	--	--	--	NS	--

[a] VE = Variance Explained.
[b] NS indicates not significant at the 95% level.

Table 4.43 presents the impact of background and demographic variables on participants' overall impression scores for the NP and CP separately. In the NP survey, a statistically significant difference was found between the group who preferred a specific planting pattern or not on the overall score of the NP. Participants who neither preferred a geometric nor a random pattern gave a significantly lower impression score for the NP than those who preferred a geometric pattern and those who preferred a random pattern.

The NP survey also showed a significant difference in the overall impression score based on age, educational qualification, income, and occupation or study group. Participants aged 60-69 years gave a significantly higher overall score than young participants aged 18-29 years. Participants with a high school or below educational qualification gave a significantly higher overall score than those with undergraduate or postgraduate and above qualifications. Low-paid participants at the level of 'less than 4,000' gave a significantly higher overall impression score for the planting than those with a salary of 12,000 and above. The overall score given by creative, or design practitioners was significantly lower than participants whose occupation or study related to biological discipline, natural environment, and other disciplines.

Similarly, in the CP survey, a significant difference was found in the overall impression score based on age, educational qualification, income, and place of current living. Participants aged 40-49 years gave a significantly lower overall score than those aged 50-59 years. Participants with a high school or below educational qualification gave a significantly higher overall score than those with undergraduate and above qualifications. High-paid participants at the level of 'above 20,000' gave a significantly lower overall impression score for the planting than those with low-paid participants at the 'less than 4,000' and '4,000-8,000' levels. The overall score given by first-tier citizens was significantly lower than those living in third-tier cities, towns, or villages.

Table 4.44 Correlation between the overall impression scores (overall, NP and CP) and components of perceptions, interests, beliefs and values

	Urban park's Overall scores (N=600)		NP's Overall score (WP, N=400)		CP's Overall score (TP, N=200)	
	r	*p*	*r*	*p*	*r*	*p*
Perceptual components						
Attractiveness and restorativeness	0.526	< 0.001	0.480	< 0.001	0.507	< 0.001
Ecological value, familiarity, and policy fitness	0.195	< 0.001	0.252	< 0.001	--	NS
Complexity and disorder	-0.199	< 0.001	-0.210	< 0.001	-0.207	0.003
Insecurity	-0.110	0.007	-0.135	0.007	--	NS
Interests variables						
Traditional Chinese Culture	0.154	< 0.001	0.209	< 0.001	0.207	< 0.001
Personal experience	--	NS[a]	--	NS	--	NS
Beliefs and values variables						
Environmental sustainability	--	NS	--	NS	--	NS
Biodiversity conservation	0.142	< 0.001	0.222	< 0.001	0.242	< 0.001
NR-6	0.245	< 0.001	0.247	< 0.001	0.265	< 0.001

[a] NS indicates not significant at the 95% level.

Table 4.44 demonstrates a significant positive correlation between the overall impression scores and the perceptual factors of perceived attractiveness and restorativeness for all types of plantings. Conversely, there is a notable negative correlation between the overall impression scores and perceived complexity and disorder across all types of plantings. However, there is no correlation between perceived ecological value, familiarity, policy fitness, perceived insecurity, and the impression score assigned to the CP.

Furthermore, participants who attributed their main source of interest in nature to traditional Chinese culture, expressed greater concerns about biodiversity conservation, and had higher NR-6 scores, tended to assign higher impression scores to vegetation.

Summary of questionnaire results

The results in this section reveal significant differences in public attitudes towards the two types of plantings, naturalistic planting (NP) and conventional planting (CP), in the scale of urban parks. Generally, the NP received a higher overall impression score than the CP. Both plantings were perceived to have attractive summer scenes, but the autumn scenes in the CP were rated poorly. Overall, the public rated plantings more positively when they perceived greater attractiveness and enjoyment, ecological values, familiarity, and fitness. Conversely, they rated them less positively when they perceived greater complexity and messiness and felt insecure in the place.

The study also found that different demographic groups gave different ratings to the plantings. Older participants rated the NP more highly than younger ones and middle-aged groups had different attitudes towards the CP. Furthermore, lower-educated and low-paid participants gave higher scores to both types of planting. The NP was more appreciated by participants working in the biological discipline and natural environment-related fields or other disciplines than by creative or design practitioners. Those who preferred geometric patterns had a similar appreciation of NP as those who preferred random patterns. In contrast, participants living in third-tier cities, towns, or villages rated the CP more highly than locals or those living in other first-tier cities.

iii) Interview results: Comparison between the naturalistic planting (NP) and conventional planting (CP)

During the interviews, participants were requested to share their impressions and feedback regarding two specific areas: Woodland Park (WP) and Traditional Park (TP), if they had visited these areas. LLP 13 conveyed the viewpoint that NP lacked cultural elements when compared to CP and further expressed that the abundance of plant species in NP contributed to its perceived messiness and disorder. LLP 14 stressed the significance of water within the landscape and believed that the poor water landscape in NP negatively affected its overall appearance. Furthermore, LLP 14 acknowledged that NP was a recently established park and noted that the plants had not yet fully grown, impacting its overall appearance. On the other hand, LLP 10 appreciated the simplicity and openness of the planting in CP, which included features such as a lake and artificial mountains. Overall, most of the interviewees (e.g., LLP 07) expressed their appreciation for the naturalistic planting design used in NP, in terms of its naturalness, colourfulness and shrub species richness.

> ***LLP 07 (M, 60-69): In the area near the West Gate (TP), the plantings are sparser, with wider spacing between the plants. It gives a sense of openness and transparency. On this side (WP), however, it appears to be denser, with more shrubs. In the western part (TP), there seem to be more trees, while here (WP), there are more shrubs. Additionally, along the small paths, there is some grass, and different varieties of the same grass, with different forms. There are also variations in the same type of flower, including different colours. In my opinion, this side is closer to nature, and I personally prefer it.***

4.5.2. Comparison between naturalistic (NP) and conventional plantings (CP) in show garden scale

i) Questionnaire results: Perceptions of vegetation in show gardens

To assess potential differences in public attitudes towards naturalistic planting (NP) and conventional planting (CP) in the EXPO show garden and to examine attitude variations among demographic groups (n=800), a Principal Component Analysis (PCA) was conducted. The names of each individual perceptual component derived from the PCA analysis and the loadings of each item can be found in Table 4.45 below.

Table 4.45 The loading of individual attitudinal variables onto specific factors

	Component loading					Eigenvalue	Variance
	1	2	3	4	5		
Component 1: Ecological value, restorativeness and policy fitness						**3.214**	**17.854%**
good for wildlife	0.778						
more natural	0.739						
more peaceful and relaxed	0.734						
happy to see more planting	0.649						
fits well with government policies	0.446		0.318				
costs less money	0.409	0.325		0.356			
Component 2: Disorder and danger						**2.609**	**14.492%**
less cared for		0.732					
messier		0.730					
feel unsafe		0.585					
I cannot see through		0.554					
Component 3: Complexity, exquisiteness and colourfulness						**1.673**	**9.295%**
More complex			0.732				
More Exquisite		-0.378	0.632				
Denser			0.554				
More colourful	0.393		0.521				
Component 4: Familiarity and attractiveness						**1.241**	**6.896%**
familiar				0.756			
pick a longer walking route to see this planting	0.301			0.633			
Component 5: Species richness						**1.022**	**5.678%**
How many different wildlife					0.820		
How many different plant species					0.750		
Components 1-5 accounted for 54.216% of the total variance.							
KMO= 0.780, Bartlett's test of Sphericity Sig = 0.000							

Table 4.46 below presents the effect of the plantings and seasons variables on the perceptual factors through one-way ANOVA (n = 800). There was a statistically significant difference in the first three perceptual components of 'ecological value, restorativeness, and policy fitness', 'disorder and danger' and 'complexity, exquisiteness and colourfulness' between the two different plantings.

Participants perceived more ecological value, restorativeness, and policy fitness from the NP than the CP, especially for the autumn scene. Similarly, participants perceived more disorder and danger from the NP than the CP in the summer. CP gave participants more sense of complexity, exquisiteness and colourfulness than the NP's. Interestingly, very high coverage of vegetation that is not green in the planting (50%-80%) was perceived as having less ecological value, restorativeness, policy fitness, disorder and danger, but it was perceived as having more complexity, exquisiteness and colourfulness, compared to the high coverage in 20% -50%. No significant difference can be found for planting and season variables on perceived familiarity and attractiveness, and perceived species richness.

Table 4.46 Effect of the plantings, seasons variables on the perceptual components

	Component 1 Ecological value, restorativeness and policy fitness				Component 2 Disorder and danger				Component 3 Complexity, exquisiteness and colourfulness				Component 4 Familiarity and attractiveness				Component 5 Species richness			
	F	*df*	*p*	*VE* [a]	*F*	*df*	*p*	*VE*	*F*	*df*	*p*	*VE*	*F*	*df*	*p*	*VE*	*F*	*df*	*p*	*VE*
Planting: NP vs CP	63.469	1, 798	< 0.001	7.4%	67.298	1, 798	< 0.001	7.8%	132.194	1, 798	< 0.001	14.2%	--	--	NS	--	--	--	NS	--
Season: Summer vs Autumn	--	--	NS[b]	--	--	--	NS	--	--	--	NS	--	--	--	NS	--	--	--	NS	--
Planting * Season	24.375	3, 796	< 0.001	8.4%	25.143	3, 796	< 0.001	8.7%	44.806	3, 796	< 0.001	14.4%	--	--	NS	--	--	--	NS	--
% of not-green-area	12.089	1, 798	< 0.001	1.5%	47.658	1, 798	< 0.001	5.6%	37.984	1, 798	< 0.001	4.5%	--	--	NS	--	--	--	NS	--

[a] Variance explained.

[b] NS indicates not significant at the 95% level.

Table 4.47 Effect of the background and socio-demographic variables on the perceptual components in the Naturalistic Planting (NP) in the NSR (N=400)

Naturalistic Planting	Component 1 Ecological value, restorativeness and policy fitness				Component 2 Disorder and danger				Component 3 Complexity, exquisiteness and colourfulness				Component 4 Familiarity and attractiveness				Component 5 Species richness			
	F	*df*	*p*	*VE* [a]	*F*	*df*	*p*	*VE*	*F*	*df*	*p*	*VE*	*F*	*df*	*p*	*VE*	*F*	*df*	*p*	*VE*
Background variables																				
Preferred type of natural area	--	--	NS[b]	--	--	--	NS	--	--	--	NS	--	--	--	NS	--	--	--	NS	--
Frequency of visiting natural area	--	--	NS	--	--	--	NS	--	--	--	NS	--	2.719	4, 395	0.029	2.7%	--	--	NS	--
Childhood experience	--	--	NS	--	--	--	NS	--	--	--	NS	--	3.903	2, 397	0.021	1.9%	--	--	NS	--
Like geometric rather than random	--	--	NS	--	17.888	2, 397	< 0.001	8.3%	4.797	2, 397	0.009	2.4%	3.250	2, 397	0.040	1.6%	--	--	NS	--
Demographic variables																				
Gender	--	--	NS	--	--	--	NS	--	--	--	NS	--	--	--	NS	--	--	--	NS	--
Age	--	--	NS	--	3.038	2, 397	0.049	1.5%	--	--	NS	--	7.485	4, 395	< 0.001	7.0%	--	--	NS	--
Education	--	--	NS	--	--	--	NS	--	4.648	3, 396	0.003	3.4%	2.762	3, 396	0.042	2.0%	--	--	NS	--
Employment	--	--	NS	--	--	--	NS	--	--	--	NS	--	5.722	6, 393	< 0.001	8.0%	--	--	NS	--
Income	--	--	NS	--	--	--	NS	--	--	--	NS	--	4.364	6, 393	< 0.001	6.2%	--	--	NS	--
Occupation	--	--	NS	--	--	--	NS	--	--	--	NS	--	4.011	4, 395	0.003	3.9%	--	--	NS	--
Religion	--	--	NS	--	4.144	3, 394	0.007	3.1%	--	--	NS	--	--	--	NS	--	--	--	NS	--
Place for growth	--	--	NS	--	--	--	NS	--	--	--	NS	--	5.562	1, 398	0.019	1.4%	--	--	NS	--
Place of living	--	--	NS	--	2.947	5, 394	0.013	3.6%	--	--	NS	--	--	--	NS	--	--	--	NS	--
Pattern of living	3.444	2, 397	0.033	1.7%	--	--	NS	--	--	--	NS	--	--	--	NS	--	--	--	NS	--

[a] Variance explained.

[b] NS indicates not significant at the 95% level.

Table 4.48 Effect of the background and socio-demographic variables on the perceptual components in the Conventional Planting (CP) in the BG (N=400)

Conventional Planting	Component 1 Ecological value, restorativeness and policy fitness				Component 2 Disorder and danger				Component 3 Complexity, exquisiteness and colourfulness				Component 4 Familiarity and attractiveness				Component 5 Species richness			
	F	*df*	*p*	*VE* [a]	*F*	*df*	*p*	*VE*	*F*	*df*	*p*	*VE*	*F*	*df*	*p*	*VE*	*F*	*df*	*p*	*VE*
Background variables																				
Preferred type of natural area	--	--	NS[b]	--	--	--	NS	--	--	--	NS	--	3.230	4, 395	0.013	3.2%	--	--	NS	--
Frequency of visiting natural area	4.475	4, 395	0.002	4.3%	--	--	NS	--	--	--	NS	--	--	--	NS	--	--	--	NS	--
Childhood experience	--	--	NS	--	--	--	NS	--	--	--	NS	--	5.377	2, 397	0.005	2.6%	--	--	NS	--
Like geometric rather than random	14.336	2, 397	< 0.001	6.7%	--	--	NS	--	--	--	NS	--	--	--	NS	--	--	--	NS	--
Demographic variables																				
Gender	--	--	NS	--	--	--	NS	--	--	--	NS	--	--	--	NS	--	--	--	NS	--
Age	--	--	NS	--	--	--	NS	--	4.134	2, 397	0.017	2.0%	5.657	4, 395	< 0.001	5.4%	--	--	NS	--
Education	--	--	NS	--	--	--	NS	--	--	--	NS	--	--	--	NS	--	--	--	NS	--
Employment	--	--	NS	--	--	--	NS	--	2.657	6, 393	0.015	3.9%	4.390	6, 393	< 0.001	6.3%	--	--	NS	--
Income	--	--	NS	--	--	--	NS	--	2.204	6, 393	0.042	3.3%	6.156	6, 393	< 0.001	8.6%	--	--	NS	--
Occupation	6.447	4, 395	< 0.001	6.1%	--	--	NS	--	--	--	NS	--	2.904	4, 395	0.022	2.9%	--	--	NS	--
Religion	--	--	NS	--	--	--	NS	--	5.649	4, 395	< 0.001	5.4%	--	--	NS	--	--	--	NS	--
Place for growth	--	--	NS	--	2.263	5, 394	0.048	2.8%	--	--	NS	--	4.371	1, 398	0.037	1.1%	--	--	NS	--
Place of living	3.074	5, 394	0.010	3.8%	--	--	NS	--	--	--	NS	--	--	--	NS	--	--	--	NS	--
Pattern of living	--	--	NS	--	--	--	NS	--	--	--	NS	--	--	--	NS	--	--	--	NS	--

[a] Variance explained.

[b] NS indicates not significant at the 95% level.

Perceptions of Naturalistic Planting (NP) in show gardens

Table 4.47 above shows the effect of the background and socio-demographic variables on the perceptual factors of the NP in the EXPO. It can be seen from the table that there was a statistically significant difference between one background variable on the perception of ecological value, enjoyment, and fitness of the NP. Participants who spent their childhood in the city and were currently living in a city perceived more ecological values, restorativeness, and fitness from the NSR planting compared to those who were born, raised, and currently living in a village.

Regarding the perception of 'disorder and danger', there are significant differences among participants based on their preference for geometric or random planting patterns, age, religion, and current place of residence. Participants who prefer random-organized planting patterns perceive less disorder and danger in naturalistic planting compared to those who prefer geometric-organized patterns. Participants in middle adulthood perceive more disorder and danger than those in young adulthood. Buddhists perceive more disorder and danger than non-religious participants and Confucianists. First-tier city residents perceive less disorder and danger than those living in third-tier cities, city fringes, and villages.

In terms of the perception of 'complexity, exquisiteness and colourfulness' there are significant differences among participants based on their preference for geometric or random planting patterns and educational qualifications. Similar to component 2, participants who prefer random-organized planting patterns perceive less complexity, exquisiteness and colourfulness in the NP compared to those who prefer geometric-organized patterns. Participants with higher levels of education feel less sense of complexity, exquisiteness and colourfulness from the NP compared to those with lower educational qualifications.

Regarding the perception of 'familiarity and attractiveness', there were statistically significant differences in background groups of 'frequency of visiting nature', 'whether had many chances experiencing nature in childhood', 'whether preferred geometric planting patterns' and socio-demographic groups of age, education, employment, income, occupation, religion, and childhood place of residence. Participants who visited natural areas more frequently and had more childhood experiences in nature were more likely to perceive more familiarity and attractiveness from the NP, while those who preferred geometric-organized patterns perceived less. Participants aged 18 to 29 perceived less familiarity and attractiveness than older participants and those with undergraduate qualifications perceived significantly less than those with postgraduate and above degrees. Students perceived significantly less than full-time employed participants, and students with no income perceived significantly less than those who were middle-paid, upper-middle-paid, and high-paid participants. Participants who were students or practitioners in biological and natural environment disciplines perceived significantly more familiarity and attractiveness of NP than those in finance, management, and other

disciplines. Participants who grew up in the village felt more familiar with and found the NP more attractive than those who grew up in city areas.

There was no statistically significant difference between background and demographic variables in the perception of species richness of the NP.

Perceptions of Conventional Planting (CP) in show gardens

Table 4.48 presented above shows the impact of background and socio-demographic variables on the perceptual factors of the CP. The table indicates that there were significant differences between background variables of 'frequency of visiting natural areas' and 'preferred planting patterns' and demographic variables of occupation and place of childhood spent on the perception of ecological value, restorativeness, and policy fitness of the CP. Participants who visited natural areas every two weeks or monthly perceived more ecological value, restorativeness, and policy fitness of the conventional planting, which is significantly different from those who visited natural areas every five years. Additionally, participants who preferred geometric-organized planting patterns also perceived significantly more than those who preferred random-organized planting patterns. Participants who were students or practitioners related to biological disciplines and natural environments or creative practice and design perceived significantly less ecological value, restorativeness, and policy fitness of the CP than those working in other disciplines. Similarly, participants living in first-tier cities also perceived significantly less than those living in third-tier cities.

Regarding the perception of disorder and danger, only one demographic variable of the place of childhood spent showed a difference within the group. Participants who grew up in third-tier cities perceived less disorder and danger than those who grew up in first-tier, second-tier cities, towns, and villages.

In the perception of complexity, exquisiteness and colourfulness, there were significant differences in socio-demographic groups of age, employment, income, and religion. Participants in young adulthood perceived more complexity, exquisiteness and colourfulness than those in middle adulthood. Part-time employed participants perceived significantly more than self-employed and retired participants. Interestingly, participants with high-level income above 20,000 perceived the least, which differed from participants with upper-middle income at 8,000-12,000. Buddhists and Daoists perceived less complexity, exquisiteness and colourfulness from the CP compared to non-religious participants and Christians.

In the perception of familiarity and attractiveness, there were significant differences in background groups of 'type of natural areas that participants most prefer to visit' and 'whether had many chances experiencing nature in childhood' and socio-demographic groups of age, employment, income, occupation, and place of a

childhood spent. Participants who preferred to visit urban forest parks found the CP less familiar and attractive than those who preferred nature reserves and mountains, forests, rivers, or coasts. Participants who had less experience with nature in childhood also perceived less than those who had more experience. In contrast to the previous component, participants in young adulthood perceived less than those in middle adulthood. Students perceived significantly less than full-time employed participants. Similarly, students perceived significantly less than those with middle, upper-middle, and high-income participants. Similarly to the result of the NP, participants who were students or practitioners related to biological disciplines and natural environments and creative practice and design perceived more familiarity and attractiveness of the CP than those working in engineering and physical science and other disciplines. Participants who spent their childhood in the village also felt familiar with and attracted to the BJ planting compared to those who grew up in city areas.

Like the NP, no statistically significant difference can be found between background and demographic background variables on the perception of species richness of the planting in the BJ.

ii) Questionnaire results: Overall impression score on vegetation in show gardens

Table 4.49 The effect of the planting and seasons variables on participants' overall impression scores

	Overall impression scores on vegetation (N=800)			
	F	*df*	*p*	*VE* [a]
Planting and season variables				
Planting: NP vs CP	14.219	1, 798	< 0.001	1.8%
Season: Summer vs Autumn	--	--	NS[b]	--
Planting * Season	5.218	3, 796	0.001	1.9%
% of not-green-area	9.099	1, 798	0.003	1.1%

[a] Variance explained.
[b] NS indicates not significant at the 95% level.

Table 4.49 presents a significant difference among planting groups regarding the overall impression score. The CP (m = 7.97, n = 400) obtained a significantly higher overall score than the NP (m = 7.57, n = 400). Furthermore, there was a significant difference between combined planting types with seasons, as the summer landscape of NP was rated significantly lower than CP in both summer and autumn sceneries. This finding is consistent with the result of the coverage of vegetation surface that is not green, indicating that very high coverage (50% -80%) was rated significantly higher than high coverage of 20%-50%.

Table 4.50 The effect of the background and demographic variables on participants' overall impression scores for NSR and BJ

	NSR's Overall score (N=400)				BJ's Overall score (N=400)			
	F	*df*	*p*	*VE* [a]	*F*	*df*	*p*	*VE*
Background variables								
Preferred type of natural area	--	--	NS[b]	--	--	--	NS	--
Frequency of visiting natural area	--	--	NS	--	--	--	NS	--
Childhood experience	--	--	NS	--	--	--	NS	--
Like geometric rather than random	--	--	NS	--	4.358	2, 397	0.013	2.1%
Demographic variables								
Gender	--	--	NS	--	--	--	NS	--
Age	--	--	NS	--	6.678	4, 395	< 0.001	6.3%
Education	2.896	3, 396	0.035	2.1%	2.991	3, 396	0.031	2.2%
Employment	--	--	NS	--	--	--	NS	--
Income	--	--	NS	--	--	--	NS	--
Occupation	--	--	NS	--	9.139	4, 395	< 0.001	8.5%
Religion	3.928	3, 394	0.009	2.9%	--	--	NS	--
Place for growth	--	--	NS	--	--	--	NS	--
Place of living	7.367	1, 398	0.007	1.8%	--	--	NS	--
Pattern of living	3.692	2, 397	0.026	1.8%	--	--	NS	--

[a] VE = Variance Explained.
[b] NS indicates not significant at the 95% level.

Table 4.50 shows the impact of background and demographic variables on participants' overall impression scores for the NSR and BJ planting groups separately. In the NSR survey, a statistically significant difference was found among the socio-demographic variables. The naturalistic planting in the NSR was rated higher by participants with high school or below educational qualifications compared to those with undergraduate degrees. Christians gave a higher score to the NSR planting than non-religious participants and Buddhists. Participants who lived in urban areas rated the NSR planting lower than those living in rural areas. Specifically, participants who grew up and currently live in urban areas rated the NSR planting lower than those who grew up in cities or villages but have moved to villages or towns.

In the BJ result, participants who preferred random-organized planting gave a lower score to conventional planting than those who preferred geometric-organized planting. Additionally, participants in young adulthood, especially those aged 18-29, rated the BJ planting lower than those in middle adulthood. Like the NSR, the BJ planting was rated higher by participants with high school or below educational qualifications compared to those with undergraduate degrees. Interestingly, the BJ planting with high visual impacts was rated lower by practitioners in the field of creative practice and design compared to other disciplines.

Table 4.51 Correlation between the overall impression scores (overall, NP and CP) and components of perceptions, interests, beliefs and values

	Show gardens' Overall scores (N=800)		NP's Overall score (NSR, N=400)		CP's Overall score (BG, N=400)	
	r	*p*	*r*	*p*	*r*	*p*
Perceptual components						
Ecological value, restorativeness and policy fitness	0.337	< 0.001	0.382	< 0.001	0.398	< 0.001
Disorder and danger	-0.174	< 0.001	-0.222	< 0.001	--	NS
Complexity, exquisiteness and colourfulness	0.239	< 0.001	0.250	< 0.001	0.162	< 0.001
Familiarity and attractiveness	0.137	< 0.001	0.252	< 0.001	--	NS
Species richness	0.177	< 0.001	0.168	< 0.001	0.179	< 0.001
Interests variables						
Traditional Chinese Culture	0.161	< 0.001	0.110	0.028	0.227	< 0.001
Personal experience	0.089	0.012	0.178	< 0.001	--	NS
Beliefs and values variables						
Environmental sustainability	--	NS[a]	--	NS	--	NS
Biodiversity conservation	0.162	< 0.001	0.218	< 0.001	0.140	0.005
NR-6	0.158	< 0.001	0.283	< 0.001	--	NS

[a] NS indicates not significant at the 95% level.

Table 4.51 indicates a strong positive correlation between the overall impression scores and the perceptual factors of perceived ecological value, restorativeness and policy fitness, as well as perceived complexity, exquisiteness and colourfulness, perceived familiarity and attractiveness, and perceived species richness. On the other hand, there is a negative correlation between the overall impression scores and perceived disorder and danger. However, there is no correlation between perceived disorder and danger, perceived familiarity and attractiveness, and the impression score assigned to the CP.

Furthermore, participants who attributed their main source of interest in nature to traditional Chinese culture and personal experience, expressed greater concerns about biodiversity conservation, and had higher NR-6 scores, tended to assign higher impression scores to vegetation.

Summary of questionnaire results

The results in this section reveal significant differences in public attitudes towards the two types of plantings in the scale of the designed garden. Participants perceived the NP to be more ecological, restorative, and in line with environmental policies, while they perceived more disorder and danger from the naturalistic planting than the CP. On the other hand, the CP was considered more complex, had a greater sense of design, and had more colours than the NP's. As for familiarity, attractiveness, and species richness, there was no evidence of a difference between the naturalistic and conventional plantings, which was consistent with the result of vegetation coverage that is not green.

Despite the overall impression score of the CP being rated higher than the NP, the sense of its ecological value, restorativeness, and policy fitness was perceived less by participants who work in biological disciplines and natural environments, creative practice and design, and some first-tier city residents. However, the familiarity and attractiveness of the CP were perceived higher by them. Participants who preferred a geometric-organized planting pattern seemed to perceive more ecological value, restorativeness, and policy fitness from the CP. On the other hand, those who preferred a random-organized planting pattern accepted the degree of disorder and danger of the NP while observing the NP's complexity, design, and colours less. Young participants, especially students, perceived the familiarity and attractiveness less for both plantings, which was in contrast with those working in biological disciplines and natural environments.

Regarding the overall impression, lower-educated participants tended to score higher for both plantings. The NP was more highly rated by village residents and Christians. At the same time, the CP was higher rated by participants who prefer geometric planting patterns, those in middle adulthood, and those with various occupations except creative practice and design.

iii) Questionnaire results: the most and least favoured aspects of plantings

In the EXPO questionnaire survey, participants were provided with a blank box to express their most favoured and least favoured aspects of the planting that they were looking at. The terms used by participants, along with their term frequencies, are presented in Table 4.52 for the naturalistic planting (NP) in NSR and Table 4.53 for the conventional planting (CP) in BG.

Table 4.52 Terms and frequencies of the most favoured (left) and least favoured (right) aspects of the NP

Naturalistic Planting (NP) in 'New Silk Road' Garden							
What do you like **the most** about this planting?				What do you like **the least** about this planting?			
Term	**Freq**[a]	**S**[b]	**A**[c]	**Term**	**Freq**	**S**	**A**
Natural	**171**	83	88	**Disordered/messy**	**89**	51	38
Colours	**108**	41	67	Low visual impact/tedium design	17	7	10
High species richness/diversity	**52**	24	28	Too few layers/heights of planting	17	3	14
Relaxed/comfortable feeling	**41**	21	20	High maintenance planting	14	8	6
Ecological/environmental-friendly planting	**32**	18	14	Layout/arrangement of planting	14	5	9
Layout/arrangement of planting	**25**	13	12	Limited application of this type of planting/not suitable for the urban context	13	8	5
Multilayers/different heights of planting	**21**	10	11	Poor maintenance	11	7	4
Low maintenance planting	**21**	10	11	too few colours	10	3	7
Random feeling / not a deliberate design	17	7	10	Too dense in planting	**9**	4	5
Enjoy the primitive wildness	17	10	7	Flies and mosquitoes/worry about pesticide	**8**	5	3
Good for wildlife	15	8	7	The appearance of Buxus Sinica	**6**	3	3
Visual impact / great ornamental value	11	6	5	Plants fall into decay/plant senescence	**6**	4	2
Well-designed planting / fine design	10	6	4	Few mature/large trees to provide shade	**6**	2	4
Many flowers	10	4	6	Not a well-designed/ fine design	**5**	3	2
Long flowering period	**9**	4	5	Not go well with the surroundings	**5**	3	2
Less human intervention	**9**	5	4	Dislike the primitive wildness	**5**	5	
Good-looking and beautiful design	**7**	4	3	Too many species	**5**	4	1
Harmonious feeling	**6**	1	5	Planting is irrelevant to the garden's theme	**5**	1	4
Suitable for the urban context	**6**	6		Cannot close contact with plants	**4**	2	2
Dynamic planting	**5**	2	3	Artificial design	**3**	2	1
Creative design	**4**	1	3	too many layers/heights of planting	**3**	2	1
Suitable for planting on a large area	**3**	1	2	Unsafe feeling	**3**	1	2
Simple design	**2**	1	1	Flat topography	**3**		3
Rustic feeling	**2**	1	1	Used the same species in a large area	**2**		2
Shape of plants	**2**		2	Design is too deliberate	**2**	1	1
Easy to observe plants	**2**	1	1	Too complex to planting	**2**	1	1
Recall the childhood memory	**2**	1	1	Too random in planting	**2**	2	
High-density planting	**1**	1		Not ecological planting	**2**	1	1
Shows natural senescence	**1**	1		no seasonal interests	**2**	1	1
Be fond of general plants	**1**		1	too many colours	**2**		2
Be fond of specific plants	**1**	1		too little species	**2**	1	1
Go well with the surroundings	**1**	1		Not much wildlife	**2**	2	
Correspond to the garden's theme	**1**	1		Worry about allergies/poisonous/smelly plants	**2**	1	1
Artificial landscape	**1**		1	Complex seed selection/purchase	**2**	2	
				Clear boundary of plant blocks / too tidy design	**1**		1
				Not artificial design	**1**	1	
				Short flowering period	**1**	1	
				The seeds are easy to move to other places	**1**	1	
				Little cultural value	**1**	1	
345 answers in total (Summer 167 + Autumn 178) 34 terms can be summarized				243 answers in total (S 122 + A 121) 39 terms can be summarized			

[a] frequency of terms. [b] summer result. [c] autumn result.

Table 4.53 Terms and frequencies of the most favoured (left) and least favoured (right) aspects of the CP

Conventional Planting (CP) Beijing Garden							
What do you like **the most** about this planting?				What do you like **the least** about this planting?			
Term	**Freq**[a]	**S**[b]	**A**[c]	**Term**	**Freq**	**S**	**A**
Colours	**114**	60	54	**Not natural planting**	**37**	15	22
High species richness/diversity	**39**	16	23	**Artificial design**	**31**	9	22
Multilayers/different heights of planting	**36**	25	11	**High maintenance planting**	**25**	9	16
Layout/arrangement of planting	**29**	10	19	**Too dense in planting**	**15**	6	9
Relaxed/comfortable feeling	**29**	18	11	**Design is too deliberate**	**14**	7	7
Natural planting	**29**	21	8	**too many colours**	**13**	4	9
Well-designed planting / fine design	**22**	8	14	**Disordered/messy planting**	**12**	8	4
Good-looking and beautiful design	**20**	5	15	**Too much species**	**12**	4	8
Visual impact / great ornamental value	**13**	11	2	Clear boundary of plant blocks / too tidy design	**9**	4	5
Go well with mount/water/rock element	**11**	4	7	Low visual impact/tedium design	**8**	1	7
Ordered/tidy/organized planting	**10**	3	7	Very strong visual impact	**8**		8
High-density planting	**6**		6	Too complex to planting	**7**	5	2
Great cultural value	**6**	3	3	Used the same species in a large area	**6**	4	2
Creative design	**5**	1	4	Layout/arrangement of planting	**4**	2	2
Native plants	**4**	2	2	too many layers/heights of planting	**4**	4	
Shape of plants	**4**	1	3	Flies and mosquitoes/worry about pesticide	**4**	2	2
Be fond of specific plants	**4**	3	1	Not ecological planting	**3**	2	1
Go well with the surroundings	**4**	1	3	too little species	**3**		3
Broad view	**3**	3		Worry about allergies/poisonous/smelly plants	**3**	2	1
Long flowering period	**3**	3		Plants fall into decay/plant senescence	**3**		3
Be fond of general plants	**3**	3		Poor maintenance	**2**	2	
Artificial landscape	**3**	1	2	too few layers/heights of planting	**2**	1	1
Harmonious feeling	**2**	1	1	Not a well-designed/ fine design	**1**	1	
Ecological/environmental-friendly planting	**2**	2		Not go well with the surroundings	**1**	1	
Enjoy the primitive wildness	**2**	2		Limited application of this type of planting/not suitable for the urban context	**1**		1
Correspond to the garden's theme	**2**	1	1	no seasonal interests	**1**	1	
smell of plants	**2**		2	Plants cannot survive in winter	**1**	1	
Scientific management	**1**	1		Few mature/large trees to provide shade	**1**	1	
Low maintenance planting	**1**		1	Cannot close contact with plants	**1**		1
Random feeling / not a deliberate design	**1**	1		Little cultural value	**1**		1
Dynamic planting	**1**		1	Planting is irrelevant to the garden's theme	**1**	1	
Suitable for planting on a large area	**1**		1				
287 answers in total (S 137 + A 150) 32 terms can be summarized				169 answers in total (S 70 + A 99) 31 terms can be summarized			

[a] frequency of terms. [b] summer result. [c] autumn result.

Overall, the most favoured aspect of naturalistic planting (NP) in NSR is its naturalness and colourfulness, as mentioned by over half or one-third of the participants who provided answers. Species richness, restorative effects, and ecological benefits are also highly appreciated aspects of NP. However, participants expressed concerns about the disorder and messiness associated with NP.

Similarly, colourfulness is the most favoured aspect of conventional planting (CP) in BG. However, in contrast to the comments regarding colourfulness being more prominent in autumn than in summer in NSR, the colourfulness of CP in autumn decreases in the BG. Participants also appreciate aspects such as species richness and multilayers in the BG. However, some participants described the conventional planting as

'unnatural' and 'artificial' which received less favourability. It is important to note that for the sake of clarity and precision, the terms 'unnatural' and 'artificial' were not considered to have the same meaning in this context.

iv) Interview results: Comparison between images of real nature, naturalistic (NP) and conventional plantings (CP)

Three images (Figure 4.6) were provided in the online interview survey for EXPO as a reference, which is shown below. participants were requested to share their impressions and feedback regarding these 3 images.

Figure 4.6 Images used in the online interview survey, including Image 1 of nature (left), Image 2 of naturalistic planting (middle) and Image 3 of Chinese conventional planting (right)

Image 1 wild nature | Image 2 naturalistic planting | Image 3 conventional planting

In relation to Image 1, which represents nature, all 21 participants unanimously regarded it as the most natural landscape compared to the other two images. They used descriptors such as 'primaeval', 'wild', 'tropical', 'luxuriant', 'no-man-land' and 'stable in vegetation community' to describe it. Furthermore, many interviewees expressed a sense of fear and insecurity associated with Image 1, which aligns with the concerns about nature discussed in section 4.3. Some interviewees, such as EXPO 12 and EXPO 01, specifically compared Image 1 and Image 2 and provided their explanations regarding the differences between the two.

> ***EXPO 12 (M, 18-29)**: I think compared to the third image; the second image is definitely more chaotic. However, compared to the first image, it is relatively neater. This is mainly because of the difference in plant types. The first image features tropical plants, which naturally have higher biodiversity, making it appear more chaotic.*

> ***EXPO 01 (M, 50-59)**: In the first image, it feels like everything is just leaves, and you can't distinguish much. In contrast, the second image doesn't feel chaotic, and it has trees that give it a sense of structure.*

According to the feedback from a few interviewees, Image 2 was perceived as somewhat disorganized, and there were concerns about the presence of potentially dangerous wildlife within the planting. However, a larger number of interviewees, such as EXPO 05 and EXPO 21, expressed their appreciation for the naturalness and visual impact depicted in Image 2. They found it delightful to see such a landscape in the city, as it differs from the conventional landscapes typically encountered.

> ***EXPO 05 (F, 18-29): The second picture seems to be a natural design or called semi-artificial design. When encountering purple flowers or something unique in the wild, I might think it was planted by humans and has reached a stable community state. However, the small deciduous trees in between seem to be planted artificially since natural distribution usually doesn't occur in such a pattern……In the second picture, there doesn't seem to be a shrub layer, but there are shrubs and herbaceous plants. Yes, and it appears to be an early stage of development. Due to its broad visibility, it doesn't feel as intimidating……For the second picture, my focus is more on the aesthetic aspect of the plant landscape. I don't necessarily have a strong desire to get close or examine the plants in detail……Therefore, I appreciate the visual appeal and the overall effect created by the landscape plants in picture two.***
>
> ***EXPO 21 (F, 40-49): I have a positive impression of both the second and third images. In the case of the third image, has a larger and more open space, which gives a clear line of sight and a comfortable feeling. On the other hand, the second image is relatively less open compared to the third image. One drawback of the second image, in my opinion, is that it lacks accessibility. Although it has greenery, it doesn't give the same sense of easy access as the third image. I would still very much like to enter that space, perhaps sit by the tree or in the vicinity. The third image, regardless of whether it is enclosed by hedges, seems to offer more possibilities for access. However, in the second picture, it feels a bit difficult to find a place to step in, making it somewhat challenging to enter. But I really like the appearance of the second image with its abundant plants and interesting variations, so I tend to prefer it a bit more than the third picture.***

When it comes to Image 3, which represents conventional planting commonly seen in daily life, the general perception among interviewees was neutral or slightly negative. Comments such as ‘nothing special’, ‘neither merit nor demerit’, ‘accustomed to it’ and ‘purely as urban greenery’ were commonly expressed. EXPO 06 explained that the conventional planting depicted in Image 3 lacks visual impact, which may contribute to the neutral or negative attitudes. However, there were also some interviewees who felt safe and pleased to see this type of planting, recognizing its functional role as essential greenery in the city. They appreciated its

neatness, which provided a pleasant feeling. EXPO 17 specifically mentioned the neatness, openness and spatial design of conventional planting as a positive aspect.

> ***EXPO 06 (F, 18-29)**: I feel that the third image has a heavy presence of artificial elements. It also gives me a sense of restricted visibility, lacking a focal point and visual interest. Additionally, I cannot perceive seasonal changes. Personally, I prefer a more diverse understory space, and I don't particularly like having my line of sight blocked by hedges or similar structures, as well as the lack of variation.*

> ***EXPO 17 (M, 30-39)**: In the third picture, I feel that it has boundaries and a clearly defined path. If I walk around it, I know I'll eventually return to my starting point and transition back to work mode. On the other hand, with the second picture, I might get so immersed and engrossed in it that I lose track of time……As for the third picture, it serves as a buffer zone. It provides a space where you can have a sensory experience that helps alleviate the sense of anxiety as it creates a sense of safety through physical distance.*

4.5.3. Comparison between real nature (BM) and NP in the urban park (WP) and show garden (NSR)

In addition to the comparison between Naturalistic Planting (NP) and Conventional Planting (CP) in urban parks and designed show gardens, as discussed in the previous section, this part of the study shifts its focus to naturalistic planting. It aims to compare naturalistic planting across different scales with real natural environments, aiming to understand how perceptions change with varying scales and contexts. As previously mentioned in Chapter 3.1, the size of the surveyed naturalistic plantings varied, ranging from 20,000 hectares in the Baihua Mountain National Nature Reserve (BM), 4.2 hectares in the Woodland Park (WP) within Lotus Lake Park, to 0.15 hectares of the 'New Silk Road' show gardens (NSR) at the Beijing Expo 2019. Consequently, this section will examine perceptions in a large-scale real nature setting in BM (n=200), a medium-scale naturalistic urban park in WP (n=400), and a small-scale naturalistic show garden in NSR (n=400).

Table 4.54 presents the means of the overall impression score and each planting's characteristics, along with the multiple comparisons and effect sizes using the Tukey multiple comparisons test. Results indicate that there is a statistically significant difference in the overall impression score and most of the characteristics among real nature, naturalistic urban park and naturalistic show garden, except for the characteristics of cost

and wildlife support. There is a significant difference in the perception of naturalness and attractiveness, with a large effect size.

A Tukey post hoc test revealed that participants perceived the naturalness and attractiveness of real natural vegetation to be statistically significantly higher than that of the naturalistic planting in urban parks and show gardens. Participants also perceived the naturalness and attractiveness of the naturalistic urban park vegetation to be significantly higher than that of the naturalistic planting in the show gardens.

Table 4.54 Mean and ANOVA result between real nature (BM), naturalistic planting in the urban park (WP) and naturalistic planting show garden (NSR) on the overall impression score and each planting's characteristics

	Mean and one-way ANOVA with Tukey post hoc			
	Real nature-BM (N=200)	**Naturalistic urban park – WP (N=400)**	**Naturalistic show garden - NSR (N=400)**	**Variance explained [c]**
Overall impression score	8.24	8.65	7.57	11.5%
Characteristics				
Familiarity	\[d]	3.89	3.43	6.1%
Unsafety	2.77	2.06	2.48	8.8%
Concerns about visibility	\	2.20	2.44	2.0%
Environmental policies fitness	\	4.05	3.52	10.9%
Willingness to see it in the city	\	4.25	4.02	2.5%
Restorativeness	4.40	4.24	3.90	7.6%
Less cost	\	3.58	3.60	--[e]
Wildlife support	\	4.01	4.09	--
Naturalness	4.69	4.46	4.01	**15.1%**
Colourfulness	4.36[a]	4.32[b]	3.97[ab]	5.2%
Messiness	2.99[a]	2.30[ab]	3.04[b]	12.3%
Denseness	3.81	2.98	3.43	9.1%
Complexness	3.58	2.88	3.26	6.3%
Less care	3.15[a]	2.41[ab]	3.01[b]	9.1%
Exquisiteness	3.62[a]	4.09[ab]	3.54[b]	7.1%
Attractiveness	4.30	4.27	3.60	**14.3%**

[ab] The mean difference is significant with $P < 0.001$, using Tukey HSD. Not superscripted means are different from each other.

[c] All % provided with $P < 0.001$. Number in **bold red**: large effect size, $\eta_p^2 > 0.14$; Number in red: medium effect size, $\eta_p^2 > 0.06$.

[d] not applicable, as no data was collected in the BM survey.

[e] --: $P > 0.050$, not significant.

It is evident from the table above that perception of characteristics from vegetation in real nature such as 'naturalness', 'colourfulness', 'attractiveness', 'restorativeness', 'denseness', 'complexness', 'unsafety' and 'less-care' is significant higher than NP in both the urban park and show garden. The perception of 'exquisiteness' achieved the highest score in urban parks among the sites. In terms of the characteristics of 'messiness' was observed that small-scale naturalistic show gardens received the highest score, followed by real nature, while medium-scale naturalistic urban parks received the lowest score.

4.5.4. Perceived and preferred characteristics of naturalistic planting (NP)

In this section, the perceived and preferred characteristics of naturalistic planting will be introduced, as these characteristics were found to be significant in the quantitative analysis and were repeatedly emphasized in the qualitative results. The differences between naturalistic planting (NP) and conventional planting (CP), as well as a real natural environment, were examined using one-way ANOVA with Tukey Post hoc analysis (Table 4.55). Additionally, Spearman correlations were used to explore the relationships among the significant characteristics (Table 4.56). Some of these characteristics were supported by the understanding and definitions provided by the interviewees themselves.

The quantitative data includes responses from a total of 800 participants, with 400 collected in the urban park and 400 in the show garden. It should be noted that the question of perceived plant species richness and perceived wildlife diversity was only asked in the EXPO survey.

Table 4.55 Mean and ANOVA result between real nature, naturalistic planting (NP) and conventional planting (CP) on overall impression score and each planting's characteristics

	Mean and one-way ANOVA with Tukey post hoc			
	Nature (N=200)	**NP (N=800)**	**CP (N=600)**	**Variance explained**
Overall impression score	8.24	8.11	7.99	-- [d]
Characteristics				
Familiarity	\ [e]	3.66	3.58	--
Unsafety	2.77 [ab]	2.26 [a]	2.35 [b]	3.0% [c]
Concerns about visibility	\	2.32	2.39	--
Environmental policies fitness	\	3.79	3.73	--
Willingness to see it in the city	\	4.13	4.04	0.4%
Restorativeness	4.40	4.07	3.80	6.0% [c]
Less cost	\	3.59	3.19	4.4% [c]
Wildlife support	\	4.05	3.72	4.0% [c]
Naturalness	4.69	4.24	3.51	**21.1%** [c]
Colourfulness	4.36	4.15	4.04	1.7% [c]
Messiness	2.99	2.67	2.48	2.8% [c]
Denseness	3.81	3.21	3.41	3.8% [c]
Complexness	3.58 [a]	3.07 [ab]	3.39 [b]	3.5% [c]
Less care	3.15	2.71	2.37	6.2% [c]
Exquisiteness	3.62 [ab]	3.81 [b]	3.93 [a]	1.1% [c]
Attractiveness	4.30	3.94	3.58	6.4% [c]

[ab] The mean difference is significant with $P < 0.001$, using Tukey HSD. Not superscripted means are different from each other.

[c] % provided with $P < 0.001$. Number in **bold red**: large effect size, $\eta_p^2 > 0.14$; Number in red: medium effect size, $\eta_p^2 > 0.06$.

[d] $P > 0.050$, not significant.

[e] not applicable, as no data was collected in the BM survey.

Table 4.56 Correlation among characteristics of naturalistic planting, grouped in main themes order

Themes	Spearman's Correlation Coefficient (N=800 in naturalistic planting)															
	Naturalness and restorativeness		**Messiness and disorder**				**Structure and pattern**			**Visual impact**			**Ecological and economic benefits**			
Key Characteristics	Naturalness	Restorativeness	Messiness	Less care	Unsafety	Concerns	Denseness	Complexity	Perceived plant species richness	Colourfulness	Exquisiteness	Attractiveness	Wildlife support	Perceived wildlife diversity	Environmenta policies fitness	Less cost
Overall impression score	0.388*	0.437*	-0.402*	-0.379*	-0.222*	-0.159*	-0.110	--	0.189*	0.374*	0.440*	0.468*	0.211*	0.203*	0.383*	0.201*
Characteristics																
Familiarity	0.302*	0.340*	-0.239*	-0.163*	-0.105*	NS	--[c]	--	--	0.250*	0.228*	0.300*	0.231*	--	0.327*	0.250*
Unsafety	-0.182*	-0.228*	0.345*	0.312*	\	0.448*	0.188*	0.097*	--	-0.173*	-0.214*	-0.202*	-0.090	-0.115	-0.144*	--
Concerns about visibility	-0.120*	-0.140*	0.270*	0.333*	0.448*	\	0.125*	0.111*	-0.173*	-0.137*	-0.138*	-0.192*	-0.088	-0.102	--	--
Environmental policies fitness	0.376*	0.376*	-0.283*	-0.213*	-0.144*	--	--	--	--	0.343*	0.335*	0.370*	0.281*	--	\	0.212*
Willingness to see it in the city	0.376*	**0.516***	-0.290*	-0.263*	-0.289*	-0.230*	--	--	--	0.337*	0.332*	0.418*	0.344*	--	0.436*	0.172*
Restorativeness	0.450*	\	-0.279*	-0.261*	-0.228*	-0.140*	--	0.084	0.099	0.404*	0.414*	0.479*	0.404*	--	0.376*	0.202*
Less cost[c]	0.207*	0.202*	--	--	--	--	--	--	--	0.126*	0.087	0.169*	0.278*	--	0.212*	\
Wildlife support	0.350*	0.404*	-0.076	--	-0.090	-0.088	0.077	0.154*	0.106	0.332*	0.239*	0.278*	\	0.152*	0.281*	0.278*
Naturalness	\[b]	0.450*	-0.243*	-0.192*	-0.182*	-0.120*	--	--	--	**0.553***	0.322*	0.468*	0.350*	--	0.376*	0.207*
Colourfulness	**0.553***	0.404*	-0.253*	-0.223*	-0.173*	-0.137*	--	0.118*	0.114	\	0.391*	0.437*	0.332*	--	0.343*	0.126*
Messiness	-0.243*	-0.279*		**0.517***	0.345*	0.270*	0.334*	0.169*	-0.098	-0.253*	-0.391*	-0.396*	-0.076	--	-0.283*	--
Denseness	--[c]	--	0.334*	0.280*	0.188*	0.125*	\	0.294*	--	--[c]	-0.078	-0.071	0.077	--	--	--
Complexity	--	0.084	0.169*	0.129*	0.097*	0.111*	0.294*	\	0.119	0.118*	0.137*	--	0.154*	--	--	--
Less care	-0.192*	-0.261*	**0.517***	\	0.312*	0.333*	0.280*	0.129*	-0.162*	-0.223*	-0.395*	-0.300*	--	-0.167*	-0.213*	--
Exquisiteness	0.322*	0.414*	-0.391*	-0.395*	-0.214*	-0.138*	-0.078	0.137*	0.121	0.391*	\	**0.561***	0.239*	--	0.335*	0.087
Attractiveness	0.468*	0.479*	-0.396*	-0.300*	-0.202*	-0.192*	-0.071	--	--	0.437*	**0.561***	N/A	0.278*	--	0.370*	0.169*
Perceived plant species richness [a]	--	0.099	-0.098	-0.162*	--	-0.173*	--	0.119	\	0.114	0.121	--	0.106	0.303*	--	--
Perceived wildlife diversity [a]	--	--	--	-0.167*	-0.115	-0.102	--	--	0.303*	--	--	--	0.152*	N/A	--	--

[a] N=400, data only collected in the NSR show garden; the rest N=800, collected in both WP urban park and NSR show garden.
[b] not applicable. [c]: P > 0.050, not significant. *: P < 0.001 (number without *: 0.001< P < 0.050).
Number in **bold red**: large effect size, r > 0.500; Number in red: medium effect size, r > 0.300.
[c] less cost: perceived less cost of planting in terms of design, maintenance, and management

i) Naturalness and restorativeness

Table 4.55 indicates that greenspace users perceive the naturalness of NP to be significantly higher than that of CP, with a large effect size. However, the naturalness of NP is still lower than that of a real natural environment. From Table 4.56, it is evident that the perception of naturalness in NP shows a positive correlation with most characteristics, particularly those related to colour, with a large effect size (r = 0.553). Conversely, there is a negative correlation between the perception of naturalness and characteristics such as unsafety, concerns about visibility through vegetation, messiness, and less care. Interestingly, there is no correlation found between the perception of naturalness and structural characteristics such as density, complexity, and perceived plant species richness.

Similarly, greenspace users perceive the restorativeness of NP to be significantly higher than that of CP, but lower than that of a real natural environment. The restorativeness of naturalistic planting is positively correlated with the attitude of being happy to see more NP in city areas. Unlike the perception of naturalness in NP, the perceived restorativeness of the planting also positively correlates with the complexity of the vegetation and the perceived richness of plant species.

Some qualitative results support the notion that greenspace users perceive the naturalness of naturalistic planting in a manner consistent with the definition of 'nature' discussed in previous sections 4.3. The perception of naturalness in planting is comprehensive and multifaceted, encompassing various factors such as the level of human intervention, density, structural complexity, vitality, and lushness of vegetation, among others. For instance, LLP 03 expressed the view that the naturalistic planting in urban parks is considered natural due to its random-organized planting patterns and the abundance of lush vegetation.

> ***LLP 03 (F, 30-39)**: It's about the arrangement, as I mentioned, it's not a deliberate arrangement where all trees are planted here, and all grass is planted there. It doesn't have a strong artificial trace. The combination of flowers, grass, shrubs, and trees is arranged in a way that feels very natural to me. Additionally, the lushness of these plants also contributes to the natural feel.*

EXPO 20 observed Figure 4.7 of NSR and concluded that the planting appeared natural based on the presence of flowers, some areas of bare ground, and the irregular shape of the vegetation.

> ***EXPO 20 (M, 18-29)**: From a visual perspective, I think it's because of the small white or light purple flowers in the background, as well as the plants in the foreground, especially the cluster in the lower left corner. I'm not sure what it is, but it appears to be naturally grown. This is lower in height compared to all the surrounding plants, and the ground seems a bit bare. Based on these characteristics, I can infer that it leans towards a more natural feeling……Typically,*

Plants with irregular shapes or forms are not intentionally clustered together in (Chinese planting) design. They are often placed in corners. This could be another reason why I perceive it as more natural.

Figure 4.7

EXPO 10 (F, 50-59) observed the planting in the figure above and considered it to be mimicking nature. However, they also noticed nuances that differentiate it from real nature, such as 'thin branches and trunks' and an 'uneven density of understory', which she found to be 'somewhat discordant with the surrounding environment'.

ii) Messiness and disorder/tidiness and order

Greenspace users perceived the messiness of NP to be significantly higher than CP but lower than that of a real natural environment (Table 4.55).

In the quantitative results, the sense of messiness in the planting is significantly positively correlated with negative responses such as feeling unsafe and concerns about visibility through vegetation. Furthermore, it is important to note that messiness also has a significant positive correlation with a lower level of perception of 'care'. The high density and complexity of the planting also tend to increase the perception of messiness in naturalistic planting. Conversely, messiness has a negative correlation with descriptions such as 'natural', 'colourful', 'exquisite', 'attractive', 'restorative', 'wildlife-friendly', 'familiar', 'policies fitness', 'happy to see more' and 'perceived plant species richness'.

Interestingly, there is no correlation between the 'less cost' of planting in terms of design, maintenance, and management and the perception of messiness, less care, feeling unsafe, or concerns about visibility in the NP.

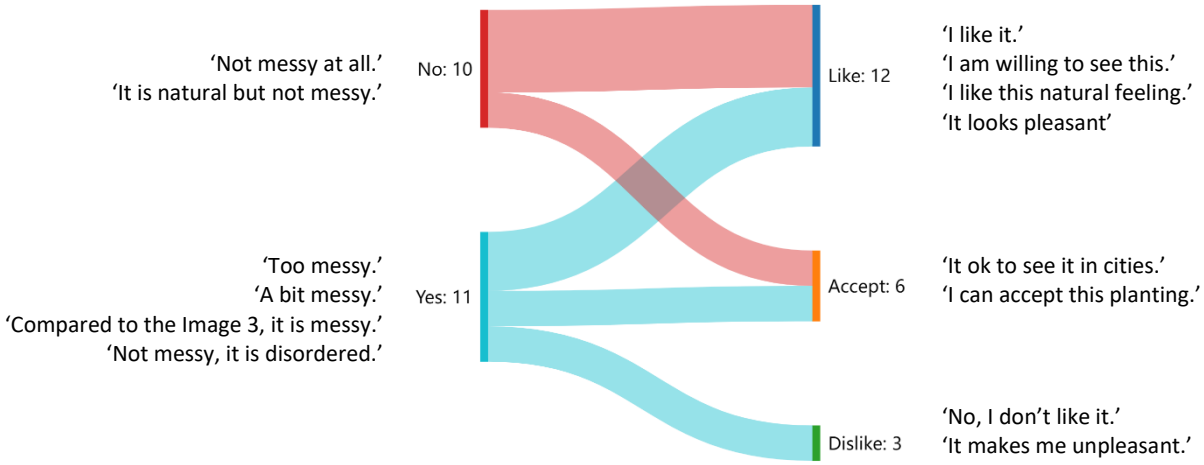
Furthermore, the perceived plant species richness of NP also does not correlate with the feeling of being unsafe.

In the qualitative results, due to variations in translation and the complexity of the context, the term 'messiness' can be described as 'messy (杂乱)' in a negative sense or as 'disordered or disorganized (无序)' in a more neutral description. It was found that some interviewees responded with descriptions of the planting's tidiness and order instead of using the terms 'messy and disordered'. These alternative descriptions were identified and analysed based on the subsequent explanations provided by the interviewees and the overall context of the conversation.

Out of the total of 45 interviewees, 34 interviewees highlighted the messiness or disorder of various vegetation types. The descriptions related to messiness and disorder included terms such as 'dead woods', 'fallen leaves', 'mixed vegetation', 'lack of obvious pattern and layers', 'dense understory', 'uncut shrubs', 'high plants', 'weeds', 'trash', 'lack of a focal point in the landscape', 'haphazard planting', 'multi-branched tree', 'different shade of colours' and 'lack of pruning or cutting'. On the other hand, the opposite description of 'order and tidiness' was associated with terms such as 'straight tree trunk', 'lined/patterned planting', 'hedgerow', ''broad leaf' (e.g., EXPO 11), 'open understory', 'mown grass', as well as the sense of being 'well-designed', 'maintained', 'planned' and 'pruned or cut'. For example, EXPO 08 provided his definition of 'messiness' in terms of characteristics such as 'mixed vegetation', 'haphazard layout', and 'lack of clear boundaries between each layer'.

> ***EXPO 11 (M, 18-29): In image one, although there are many different plant species, the plants appear to have thick and large leaves with a sense of volume, giving the impression that they are planted in a neat and orderly manner, with each plant positioned next to another. However, in image two, there is a sense of disorder with plants of various sizes and shapes scattered throughout the area.***
>
> ***EXPO 08 (M, 18-29): In terms of plant species, there will be a variety of plants, such as grass A, grass B, and grass C, all mixed together. Secondly, regarding the layout, there are differences in where they can grow. Each plant has its own place, and it can grow in various locations, like around tree roots, in corners, or in different areas. Lastly, in Image 3 (TP), you can clearly see the division between the lawn and the trees, and the shrubs are layered in three distinct levels. However, in Image 2 (NSR), the layers are not as pronounced. Some grass may be taller, some may be low to the ground, some trees have lush foliage and grow tall, while others have multiple branches on the trunk. Because of these three reasons, I think Image 2 (NSR) appears more disorganized compared to Image 3 (TP).***

Figure 4.8 Sankey diagram for responses of messiness and its acceptances towards NP in EXPO interview survey



In the EXPO interview survey, a total of 21 interviewees were shown the same image of the NSR (Naturalistic Planting) and were asked questions related to its messiness, disorder, and their level of acceptance towards it. Out of the 21 interviewees, 10 explicitly expressed that the NSR's planting was not messy, while 11 interviewees explicitly expressed that it was messy or disordered (Figure 4.8).

It is worth noting that the term 'messiness' is generally perceived as negative when describing planting, but not everyone perceives it negatively. Among these 21 interviewees, 12 expressed a positive response to this planting, 6 expressed that they could accept it, and only 3 interviewees considered it to be messy and expressed their dislike for it.

LLP 01 mentioned that the acceptance of the messiness and disorder of planting may vary depending on the generation and their traditional concepts.

> ***LLP 01 (M, 18-29): I think the older generation may be accustomed to being constrained and may prefer more structured and ordered environments. However, younger people like us may prefer a sense of freedom and lack of constraints. I believe this kind of environment can help alleviate the work pressure for young people in the city.***

LLP 11 suggested that to maintain the tidiness and order of the planting, it is important to clearly display and implement the initial design concept throughout the follow-up maintenance process. This ensures that the intended vision and design intent are preserved over time.

> ***LLP 11 (M, 40-49): The initial design concept should be reflected in the ongoing maintenance of the vegetation. It is important to continuously maintain the quantity and height variations of each plant. As plants grow, they may become overgrown, or some may not survive. In such cases, timely replanting or pruning is necessary to ensure that the original design intent is***

preserved. By actively maintaining the vegetation, the initial design concept can be effectively showcased and sustained.

iii) Structure and pattern: density, complexity, and species richness

Greenspace users' perception of the density of NP is significantly less than CP and the natural environment (Table 4.55). There is a positive correlation between the density of naturalistic planting and various negative perceptions and concerns (Table 4.56). As the density of the planting increases, participants are more likely to perceive feelings of unsafety, messiness, less care, less attractiveness, less exquisite, and concerns about visibility through the vegetation. Additionally, the perception of complexity and support for wildlife also increase with density.

The perception of the complexity of NP (m=3.07) is significantly lower than that of CP (m=3.39) and a semi-natural environment (m=3.57), according to the quantitative results ($p<0.001$, $\eta_p^2=0.035$). In contrast to density, the perception of complexity is positively correlated with restorativeness, colourfulness, perceived plant species richness, and the sense of well-designed features.

Regarding perceived plant species richness, NP (m=3.67) in the NSR is significantly lower than CP in the BG in the EXPO show garden (m=3.88, $p<0.001$, $\eta_p^2=0.021$). It can be observed that the perception of plant species richness in naturalistic planting is strongly positively correlated with perceived wildlife diversity, with a medium effect size (r=0.303). Interestingly, in the NSR, participants who perceive higher plant species richness are more likely to consider naturalistic planting as being more cared for.

The structure and pattern of naturalistic planting, including characteristics such as planting density, complexity, and species richness, were found to be significant factors associated with the perception of NP's naturalness and messiness/disorder, as discussed in the previous sections.

In the qualitative results, it was found that some interviewees expressed appreciation for dense planting, perceiving it as presenting a sense of 'flourishing greenery' and a 'visually rich scenery'. However, there were also interviewees who had a negative perception of dense planting, describing it as 'messy looking' (such as EXPO 11, M, 18-25), leading to 'feelings of oppression, depression' (such as LLP 04, M, 18-25), and 'insecurity' (such as EXPO 05, F, 18-25). Additionally, concerns were raised about the potential negative impact on plant growth due to the density of the planting.

Furthermore, in terms of planting's complexity, it was observed that many interviewees emphasized the characteristic of 'multi-layered (层次)' to describe the horizontal layout and the vertical layers of the planting.

***EXPO 19 (F, 18-29)**: It not only has rich layering but also a variety of colours and diverse plant species…… Firstly, it should have a varied height and be arranged in a staggered manner, right? It should have both high and low elements. Another aspect is the colour, which should not be too uniform.*

***EXPO 20 (M, 18-29)**: It gives me the impression that due to its multi-layers, you cannot see everything clearly, and you may encounter some unusual situations. There is even a possibility of getting lost or trapped inside.*

***LLP 04 (M, 18-29)**: For example, along this path, trees are planted at intervals of three to five meters on both sides. Beyond the trees, there is a lawn that extends further back. This creates a simple layering effect. When you walk or glance over, you can easily distinguish the trees, the lawn, and the vegetation or structures in the background……you can immediately identify and understand the different elements instead of feeling overwhelmed or unsure about what you're looking at……Additionally, without taller trees (in WP), it's difficult to clearly see the presence of trees in that area. This makes (WP) challenging to distinguish between small shrubs and large shrubs.*

***LLP 05 (M, 18-29)**: On one side, there are neatly arranged trees, while on the other side, there are shrubs and flowers arranged in layers or with distinct area divisions. This design gives it a sense of intentional arrangement rather than a natural feel.*

iv) Visual impact and seasonal interests: Colour, exquisiteness and attractiveness

From Table 4.56, it is clear that the characteristic of exquisiteness of the NP also demonstrates a strong positive correlation with the NP's attractiveness, with a large effect size. It is worth noting that the perception of wildlife diversity in NP does not correlate with the characteristics of colourfulness, exquisiteness, and attractiveness in this survey.

In the qualitative results, one interviewee (e.g., LLP 04) explained that the colour in NP appears chaotic because it predominantly consists of a monotonous green colour with low colour contrast. This is different from CP, which often uses high colour contrast by using red and yellow colours. Interestingly, red colour seems to be preferred by many interviewees, as nine of them mentioned that they would like to see red colour in planting. Additionally, apart from LLP 04, another interviewee (LLP 07) also mentioned that using high-contrast colours is more attractive in planting.

> ***LLP 04 (M, 18-29)*: It appears chaotic, and it can be challenging to differentiate between shades of green due to the relatively monotonous colour scheme. When the colours are monotonous, you may not feel inclined to pay close attention to distinguishing between different shades, for example, light green and dark green…… Additionally, the contrast between the green and purple colours is not very pronounced. When looking at the scene, you may perceive it as simply a dark shade of green without much contrast. In contrast, if there were some vibrant red flowers or yellow flowers planted in China, it would create a more striking visual impact.**

In the quantitative analysis, it was observed that seasonal interests did not have a significant impact on the overall impression score, as well as the characteristics of colourfulness, well design, and attractiveness in NP. However, it is worth noting that in conventional planting, the rating for attractiveness was significantly higher in summer (m=3.75) compared to autumn scenery (m=3.45, $p<0.001$, $\eta_p^2=0.018$).

In contrast, the qualitative results revealed that many interviewees emphasized the importance of seasonal impacts in planting and expressed their appreciation for the seasonal interests in plantings, such as it 'provides changing but unique scenarios', 'meaningful symbols like people's life', 'reflects natural succession', and 'offers rich colours in autumn'. Some interviewees further elaborated on the perspectives that other people may hold regarding seasonal interests, considering factors such as decision makers' personal preferences (e.g., EXPO 06), political considerations (e.g., EXPO 13), and acceptance among different age groups (e.g., LLP 06).

> ***EXPO 06 (F, 18-29)*: I really enjoy the changing landscapes throughout the four seasons. It's fascinating to witness the vibrant growth and the natural decay during autumn, as it represents the cycle of life. It makes me feel connected to the process of life. However, when it comes to the decline of plants, I personally find it ecologically significant, as it reflects natural succession. However, some people, such as certain officials in China who are involved in municipal parks, may not appreciate the sight of plant decay. They prefer parks with flowers blooming in all seasons and vibrant colours like red and purple. They prefer a more festive and livelier atmosphere.**

> ***EXPO 13 (F, 18-29)*: Because some people may just want to see beautiful flowers throughout the year, or it could be due to certain political or other needs, they prefer a perpetually prosperous appearance. Personally, I prefer the changing seasons because each species has its own unique characteristics.**

Regarding the issues of plant senescence and the decline of deciduous plants in other seasons such as winter, the majority of interviewees expressed their acceptance and did not report any negative feelings. However, some interviewees also expressed concerns about potential issues of messiness, maintenance, and the risk of

fire, particularly when naturalistic planting appears in city centres. LLP 06 emphasized the importance of maintaining a proper mix proportion of evergreen and deciduous plants.

> ***LLP 06 (M, 40-49)*: The general perception is that an evergreen landscape is preferable, but it also depends on the proportion. I believe that certain areas should indeed have the presence of autumn foliage and falling leaves, as different age groups perceive and experience things differently. Umm, yes, it is also necessary to have some seasonal changes.**

v) Ecological benefits and wildlife: wildlife support, perceived wildlife diversity, environmental policies fitness and less cost

From Table 4.56, there is a relationship between the perception of wildlife support and the perceived plant species richness. Participants who perceived a higher plant species richness in the NP were more likely to consider it supportive for wildlife and their living habitats. Furthermore, NP's environmental policies fitness also displays positive correlations with characteristics such as wildlife support, familiarity, and lower cost, among other positive attributes.

In the general context, wildlife refers to undomesticated animal species. Examples of wildlife, such as birds, insects, and small mammals were provided in the questionnaire to guide participants' understanding. However, during the interviews, interviewees had various interpretations of wildlife, including both large predators like tigers and bears, as well as pollinators like birds and bees. The interviews allowed for more in-depth discussions and follow-up questions to gain detailed information about the interviewees' perspectives on wildlife. Overall, when interviewees discussed wildlife, birds were mentioned most frequently, with 15 interviewees expressing their thoughts and concerns about them. In some instances, negative contexts involved flies, mice, and pests.

In line with the quantitative results, many interviewees believed that NP provided more habitats for wildlife compared to CP. They recognized the importance of supporting wildlife in urban areas. However, there were also concerns expressed by some interviewees regarding the potential negative consequences of having an excessive amount of wildlife in urban areas. EXPO 17 specifically mentioned the example of Chernobyl (a Ukrainian Nuclear Power Plant that had a nuclear accident in 1986) to illustrate the point, which implies the potential risks and challenges that may arise when wildlife populations become too abundant or out of balance in urban environments.

> ***EXPO 17 (M, 30-39)*: For example, birds…… can result in bird droppings……Similarly, the presence of stray cats and dogs or other wild animals can affect the cleanliness of the urban environment**

and even contribute to the spread of diseases. However, if we occasionally encounter one or two of these animals, it can still be a pleasant experience……In my opinion, it's acceptable to have small animals in the city, but we should try to minimize the presence of thickets or dense vegetation that could provide a habitat for them. If the city is invaded and eroded by animals or wildlife, it could lead to the gradual abandonment of the urban environment, similar to the deserted city of Chornobyl. Although Chernobyl now appears to be teeming with vibrant plant life, it gives off a sense of desolation and decay rather than being a testament to human civilization. It represents the end of human civilization rather than a harmonious coexistence with nature, which is the current state of Chernobyl.

LLP 04 shared the perspective that regardless of the type of planting in cities, the wildlife present cannot truly be considered wild animals. Instead, they are seen as domesticated animals inhabiting large urban environments. This viewpoint highlights the contrast between the natural habitats of wildlife and the artificial urban setting, suggesting that the presence of wildlife in cities may be a result of human intervention and adaptation rather than a truly wild and natural state.

LLP 04 (M, 18-29): Or to put it another way, when you see one or two squirrels in the Lotus Pond Park, don't you feel like they are being confined in a larger enclosure? In reality, they haven't become true wild animals; they are more like domesticated ones. Someone regularly feeds them, and without that feeding, they would starve. So, they are still considered as pets. No matter how well-designed the planting is, you cannot turn these animals into truly wild creatures unless it's a natural reserve.

vi) Emerging themes: location and cultural-relatedness

Themes: location

The location of naturalistic planting also plays a significant role in the qualitative results. It was observed that when naturalistic planting is implemented in urban areas, particularly in central areas expecting a more controlled and manicured appearance, certain interviewees, such as EXPO 07 and 08, expressed their discomfort with this approach, considering the contrast to be too strong and unpleasant.

EXPO 07 (F, 18-29): For example, the Central Business District (CBD) may not be suitable for such plantings (NP). Even if there are some plants in the CBD, it should be limited to a small area as it may not be well-suited for extensive greenery. The CBD often gives a more commercialized vibe, while plants should evoke a sense of refinement. On the other hand, in residential areas,

> ***incorporating such plantings can create a closer and more intimate connection with nature. It's just my personal opinion, but the choice of plantings might indeed depend on the location within the city.***
>
> ***EXPO 08 (M, 18-29): I feel that the contrast between high-rise buildings and naturalistic plantings is quite strong. In other words, an environment like the one in Image 2 tends to be more chaotic, while high-rise buildings represent a highly organized order. However, when these two elements are placed together to form a composition, their contrast becomes quite pronounced.***

In contrast to those who dislike the strong contrast in naturalistic planting in the city centre, there are interviewees like LLP 04 and 05 who appreciate it precisely for its ability to provide a brief respite from their daily lives and an opportunity to connect with nature amidst the bustling city environment. LLP 04, in particular, may have a lower overall impression of naturalistic planting due to its 'disordered and messy' appearance, but when considering its location, he expressed a preference for seeing it in the central city.

> ***LLP 04 (M, 18-29): If I see it in the city centre, I might be relatively happier. If I see it in the suburbs, I don't... I feel like this park has been abandoned for a long time, so it gives me a sense of neglect. After all, the impression of the city centre is filled with various malls and towering skyscrapers, office buildings. In contrast, this natural garden design appears more rugged and wilder, creating a strong contrast with its surroundings. If I see it, I might exclaim, 'Wow, this place is incredibly lush', and it would instantly catch my eye.***
>
> ***LLP 05 (M, 18-29): For people living in the city centre, having such a natural landscape is definitely a precious resource…… Many people may take the opportunity to relax and rejuvenate during their lunch breaks or in the afternoon. It allows them to escape from the fatigue of their daily lives. I believe it would be greatly appreciated by urban dwellers. On the other hand, people living in the suburbs may already have many options and access to natural surroundings. The suburbs often offer a more relaxed atmosphere with less dense housing and abundant vegetation. Therefore, this kind of landscape may not have as much appeal to them compared to city dwellers.***

Other interviewees also shared their opinions regarding the location of naturalistic planting. For instance, EXPO 03 believed that while naturalistic planting may be suitable for central areas in some cities, it may not be the best fit for a city like Beijing. On the other hand, EXPO 10 considered that naturalistic planting would be well-suited for relaxation-focused areas such as residential neighbourhoods. In addition to 'urban parks' and 'residential areas', interviewees mentioned other potential locations for naturalistic planting, including

'roadscapes', 'industrial areas', 'campuses', and 'commercial leisure-focused areas'. Furthermore, EXPO 04 expressed the opinion that naturalistic planting may not be suitable for government-related or authority areas, as these spaces often require a more solemn and formal atmosphere. The relaxed and informal nature of naturalistic planting might not align with the desired ambience in such locations. These diverse perspectives suggest that the appropriateness of naturalistic planting in different locations can vary based on factors such as the city's characteristics, the intended purpose of the area, and the potential users' preferences.

> ***EXPO 03 (M, 18-29)**: I believe it should be evaluated based on different cities and their respective city centres. Some city centres may not be suitable, while others may be…… In my opinion, it may not be suitable in the city centre of Beijing…… However, in cities located in southern coastal cities of China, central and western parts of China, as well as some northern cities, it may be more appropriate.*

> ***EXPO 10 (F, 18-29)**: If it's in the city centre, it's either an economic hub or an educational centre. Such places are not suitable for a relaxation-focused theme. However, in residential areas, a more relaxed and tranquil scene can be appropriate and desirable.*

Themes: cultural-relatedness

Some interviewees emphasized the importance of having a certain meaning and cultural symbols in plantings. These symbols can serve purposes such as international publicity, displaying regional identity, and increasing festivity. Examples mentioned include patterned planting and green structures. LLP 13 specifically commented on the cultural-relatedness of the planting in Lotus Lake Park. They pointed out that the NP in the park lacked cultural symbols associated with the lotus, which is a significant cultural element. Furthermore, he felt that the planting should have included native species commonly found in Beijing to enhance its cultural significance.

> ***LLP 13 (M, 60-69)**: Because this is characteristic of the LLP. That (NP) planting can be done in any park…… It lacks cultural elements……It has already deviated from the features of Lotus Lake Park. Moreover, there are too many plants, many of which are not representative of Beijing's characteristics, right? There are various trees that we have never seen before.*

| Chapter 5 : Discussion

The previous chapters have presented the findings in the order of research questions (expect for socio-demographic findings), which derived from a combination of quantitative and qualitative research. In this chapter, the results are discussed in the same research question order (Table 5.1), starting with a broader background question concerning the concept of 'nature', with a specific focus on 'wild nature'. The discussion then transitions to the topic of 'urban nature' and ultimately delves into the core question of this research, which explores public attitudes towards 'naturalistic planting' in urban areas. The greenspace users' beliefs and values and socio-demographic factors are discussed in the end.

Table 5.1 The structure of the discussion chapter

Research question	Discussion in the following section
Question 1: **How do Chinese greenspace users recognise, define and perceive 'nature'?**	▪ **Participant patterns of using nature** ▪ **Representation and definition of nature** ▪ **Concerns about nature** ▪ **The role of Chinese culture**
Question 2: **How do Chinese greenspace users recognise and evaluate 'urban greenspace'?**	▪ **Recognition of the relationship between the 'city' and 'nature'** ▪ **Evaluation of and attitude to urban nature** ▪ **Beliefs and values related to the urban environment**
Question 3: **How do greenspace users perceive naturalistic planting in urban areas?**	▪ **Comparison between Naturalistic Planting (NP) and Conventional Planting (CP)** ▪ **Comparison between real nature and Naturalistic Planting (NP)** ▪ **Preferred key characteristics of naturalistic planting**
Question 4: **Are greenspace users' beliefs and values and socio-demographic factors drivers of these responses?**	

These findings are discussed in the context of existing literature and knowledge, providing a comprehensive and deeper interpretation of the topic. By exploring how people perceive and engage with nature in various settings, this chapter contributes to a broader understanding of the human-nature relationship in contemporary Chinese societies. Moreover, it offers valuable insights into public attitudes towards naturalistic planting design in China, which can inform future urban natural sustainable landscape design and cost-efficient management.

5.1. Research Question 1:

How do Chinese greenspace users recognise, define and perceive 'nature'?

This research question aims to explore the responses of greenspace users in China to nature and natural vegetation, with a focus on filling gaps in our understanding of how nature is recognized, described, and perceived in the context of China. It also establishes a strong foundation of knowledge on urban nature and naturalistic planting in the urban context for subsequent research questions.

The research question begins by examining current participant patterns of using nature and then delves into the representation and definition of nature. It discussed the drivers that influence greenspace users' perceptions of nature vegetation, along with concerns about nature and historical views on nature deeply rooted in Chinese culture from ancient times to the present day.

5.1.1. Participant patterns of using nature

i) Frequency of visiting nature

This study, based on 1,000 self-reported responses, revealed that approximately 60% of participants reported visiting natural areas every six months to a year. About 27.7% of participants visited monthly, while 9.7% visited every two weeks or less frequently. A small proportion of participants indicated visiting natural areas once every five years or even less frequently.

The self-reported frequency of nature visits in China appears to be lower than in some other countries where the frequency of visits had been measured. In England, a study indicated that approximately 75% of the adult population visited natural environments on a monthly basis or more frequently (Boyd *et al.*, 2018). Similarly, in Finland, around one-third of the participants reported taking their children to visit nature once a week or more,

and another 30% visited nature one to three times a month (Gustafsson *et al.*, 2021). In Norway, over half of the adults dedicate at least one hour to nature-based physical activity during a regular week (Calogiuri, Patil and Aamodt, 2016). These findings highlight the relatively limited opportunities for nature visits among Chinese greenspace users, which can be attributed to factors such as physical accessibility to nature, personal circumstances, and varying definitions of 'nature' and 'natural areas'.

It is essential to mention that the data collected for the EXPO survey (800 out of 1,000 responses) was gathered before the COVID-19 pandemic, while an additional 200 responses were collected in Baihua Mountain Nature Reserve in 2021 during the pandemic. A comparison of the two datasets revealed that Chinese greenspace users reported visiting nature more frequently during the pandemic. In the EXPO survey, only about 7% of participants visited nature every two weeks or less, whereas in the nature reserve survey, over 20% of participants reported visiting nature at the same frequency. This suggests an increase in natural visitation among greenspace users during the pandemic. Similar trends were observed in research conducted in Belgium (Lenaerts *et al.*, 2021) and Norway (Litleskare and Calogiuri, 2023), where people reported more frequent visits to nature during the pandemic for the benefits of physical activity and mental health. However, it is important to consider that movement and visitation during the pandemic were influenced by national and regional guidelines and legislation, which varied across different locations. Additionally, there may be a potential influence of site selection bias, as nature reserves may attract participants who are more inclined to visit nature frequently. Further research is needed to provide additional evidence on the importance of nature visitation during the pandemic and its functionality in providing physical and psychological benefits.

ii) Reason for visiting nature

In terms of the reasons for visiting nature, this study examined all 1,600 participants by ranking four provided reasons for visiting nature in the questionnaire survey. The primary motivation for visiting nature was using it as a leisure setting, particularly among retired individuals in late adulthood. According to (Rhode and Kendle, 1997), some greenspace users tend to prioritize their social life and perceive their surrounding environments as a mere 'backdrop' in which people interact, yet they can still experience psychological restoration from the background green planting (Hoyle, Hitchmough and Jorgensen, 2017a).

Engaging in activities such as wandering, running, and taking photos in nature ranked high as important reasons for visiting, particularly among females and retired individuals in late adulthood. Our interviews further highlighted that, in addition to passive sedentary experiences, engaging in dynamic physical activities within natural environments was also highly valued. Interviewees provided additional insights, such as the joy of discovering new locations and engaging in mountain-climbing. It can be attributed to the fact that nature

serves as a setting that inspires exploratory and adventurous behaviours, offering a unique combination of mystery and legibility to greenspace users (Kaplan and Kaplan, 1989).

Active observation of nature emerged as the third most significant reason for visiting, with a higher preference observed among female participants. Early research has highlighted the importance of observation as a means of engaging with nature, as it provides immense pleasure and enjoyment derived from observing the natural elements (Kaplan, 1984).

Passing by, living, and working in proximity to nature were identified as the least significant reasons for visiting, highlighting the passive nature of being in proximity to the natural environment. In a study focusing on active and passive use of green space, passive interaction with nature, which differs from active use, was not strongly linked to indicators of health and well-being (Holt *et al.*, 2019).

iii) Type of natural areas that participants preferred to visit

The findings from the questionnaire survey conducted at EXPO, with 800 responses indicated that most participants showed a strong preference for visiting 'mountain, forest, river, or coast' natural areas, 'national nature reserves' and 'urban forest parks'. These preferences align with Dutch research on landscape type preferences, which suggests that humans prefer greatness and forces of nature and wild, interactive landscapes (DeGroot and Van den Born, 2003). Natural areas such as mountains, forests, rivers, and coasts often offer diverse and immersive experiences, providing opportunities for relaxation, recreation, and the exploration of natural beauty (Kaplan and Kaplan, 1989).

On the other hand, 'ornamental parks' and 'other natural areas' were the least preferred options among participants. This finding may be attributed to the perception that ornamental parks often prioritize manicured and artificial landscapes, which may not evoke the same sense of connection and authenticity as more natural landscapes (Özgüner and Kendle, 2006).

It is important to acknowledge that the term 'natural areas', as utilized in the EXPO questionnaire to inquire about preferred natural areas, encompassed a broad spectrum of green and blue spaces. The interpretation of the term and the perception of its naturalness were left to the discretion of the participants themselves. The concept of nature is multifaceted and can manifest in diverse forms and appearances, a notion that corresponds with the distinct levels of naturalness as outlined by Cordell and Hendee (1982). These levels include primitive, semi-primitive non-motorized, semi-primitive motorized, roaded natural, rural, and urban. Consequently, the outcome obtained reflects a general trend in how 'natural areas' are defined. For a more

comprehensive understanding of this definition and the representation of nature, further discussion will be combined with Section 5.1.2.

iv) Nature relatedness

On the NR-6 scale of 1600 participants, the mean NR-6 score was observed to be 4.11 (with a range from 1 to 5). This finding indicates a relatively higher nature-relatedness compared to similar studies conducted in other countries. For instance, research involving student participants from Hungary, India, South Korea, and Canada reported mean NR-6 scores of 3.25, 3.53, 3.44, and 3.16, respectively (Kövi *et al.*, 2023). Another study conducted in the Philippines reported mean NR scores of 3.54 and 3.56 in two separate surveys involving participants ranging in age from 18 to 75 years old and 18 to 21 years old, respectively (Aruta and Pakingan, 2022). The slightly higher NR-6 mean score in this research may be attributed to the potential site selection bias, as the study focused on greenspace users who may have a stronger connection to nature due to their higher frequency of spending time in natural and outdoor environments (Nisbet, Zelenski and Murphy, 2009; Nisbet and Zelenski, 2013).

Furthermore, significant differences were observed between the survey places in terms of NR-6 scores. Participants surveyed in the nature reserve reported the highest NR-6 score, followed by those surveyed in city parks, while the participants surveyed at the EXPO reported the lowest NR-6 scores. These findings align with previous observations indicating higher frequencies of nature visits in the BM nature reserve and lower frequencies at the EXPO. This further reinforces the connection between nature visitation and nature-relatedness scores, as supported by existing literature (Nisbet and Zelenski, 2013).

Additionally, it was observed that participants' NR-6 scores increased with their age, which aligns with the findings of a previous study that compared the Connection to Nature Index (CNI) and NR-6 scale. This study revealed a similar pattern of declining scores in childhood, reaching a low point in the mid-teens, followed by an increase in the early 20s, and a plateau thereafter throughout life (Hughes *et al.*, 2019).

5.1.2. Representation and definition of nature

This section aims to examine the perspectives of Chinese greenspace users regarding nature, focusing on their ideals of nature representation, the defining characteristics of nature, and the relationship between humans and nature.

Results on quantitative data from picture selection indicated that participants (n=1600) tended to consider minimal human intervention with the larger scale of scenes as representative of nature. It aligns with the

qualitative data from interviews which provides additional, more detailed insights into the characteristics of nature recognition, definition and perception. From the analysis of these qualitative statements, six themes emerged: i) minimal human intervention; ii) large scale or broad view; iii) dense, complex, and disordered vegetation; iv) various types, vibrant dynamic processes, and wildlife; v) evoking fresh sensations; vi) resemblance to childhood nature experiences.

i) The role of human intervention

Human intervention in natural environments encompasses a diverse range of meanings, behaviours and various human or artificial traces, including behaviours that can have negative impacts on nature such as interference and overdevelopment. However, it also involves positive intentions such as design, management, and maintenance, as summarised in the qualitative analysis conducted in the results chapter of this research. Design is typically viewed as distinct interventions, while management and maintenance involve ongoing interventions (Colley and Craig, 2019).

In the context of this research, a significant finding was that approximately half of the interviewees regarded minimal human intervention as a defining characteristic of 'real nature'. The use of terms like 'primitive' or 'pristine' in describing nature echoes the first level of naturalness in the 6-level Recreation Opportunity Spectrum (ROS) identified by Cordell and Hendee (1982). Most other descriptions of nature given by interviewees fell into the remaining three levels of 'semi-primitive nonmotorized', 'semi-primitive motorized', and 'roaded natural'. They used phrases such as 'allows limited human activities' and 'informal paths'. Very few described nature in the last two levels, 'rural' and 'urban', and only one interviewee described nature as being blended with and interacting with the human daily living environment.

Furthermore, the term 'spontaneousness' was frequently emphasized in our interview results. This is consistent with the fact that about one-fourth of 1600 questionnaire participants selected a picture depicting spontaneous plants growing on a hard pavement as a representation of nature. Whether it was describing rotting fallen leaves or naturally evolved basins or mountains, nature was commonly considered a wild place with spontaneous processes in our research. This finding aligns with the viewpoint of Ridder (2007), who emphasizes that naturalness is often associated with processes occurring without human intervention. This concept is in line with the definition of wild spaces where human intervention is minimal or absent, allowing organisms to autonomously respond to their natural instincts or self-assemble (Threlfall and Kendal, 2018).

One interviewee in this study employed the metaphor of 'parasites or bacteria' to depict the relationship between humans and nature, conveying a humble attitude towards humans' interaction with the natural world. This portrayal reflects the belief that nature is a sacred and larger-than-human realm. Ridder (2007) asserts

that it is a moral imperative for humans to respect the autonomy of nature, just as they should respect the autonomy of other humans. Nature is often highly appreciated precisely because it is independent of human intention and control (Elliot, 1997). This can be explained by the 'green theory of value' proposed by Goodin (1992) which suggests that people desire to find meaning and patterns in their lives, and these can be precisely provided by the products of natural processes untouched by human hands.

It should be noted that the absence of human intervention as a defining characteristic of nature does not hold true for all participants and interviewees. One interviewee in the research expressed a perspective that humans are an integral part of nature, considering nature as an environment intertwined with various human interventions. This view aligns with the concept of 'mundane nature' in urban areas (Newman and Dale, 2013), which encompasses 'cultivated nature' and 'nature on display'. This perspective emphasizes that nature has a close and interactive relationship with human interventions.

Moreover, the concepts of the wildness of nature and human intervention are not inherently contradictory or mutually exclusive. This is evident in the research conducted in North-East Scotland, which revealed that semi-natural and designed greenspaces were perceived as both wild and managed simultaneously (Colley and Craig, 2019). Additionally, this research also pointed out that perceived levels of human intervention may not necessarily align with the actual extent of intervention that has occurred.

Despite the fact that minimal human intervention was identified as the most prominent defining and depicting characteristic of nature by most interviewees, it is surprising to find that many individuals perceive real nature as something that can be created and designed by humans. Out of the 21 interviewees, 15 mentioned this perspective. While it was acknowledged that designed nature might have weaker natural succession and higher maintenance costs, the concept of designed nature was considered more suitable for human appreciation. This finding aligns with Nassauer's studies (1995b), which suggest that 'cues to care' in terms of human intention and design help greenspace users perceive 'nature' as aesthetically pleasing rather than as 'neglected land awaiting development'.

Several interviewees asserted that nature cannot be created by humans, as it inherently lacks the authenticity and true features of real nature. According to their perspective, the role of humans is limited to activities such as restoring, integrating, or mimicking nature. These seemingly contradictory perspectives can be reconciled by recognizing that humans have been creating and designing nature since ancient times. While advancements in technology and design have allowed for greater control over natural environments, there is still a recognition that the intricate complexities and balance found in untouched, pristine nature are beyond human comprehension and control. Ridder (2007) acknowledged that the purest form of real nature is devoid of human intervention, but certain human activities, such as ecological restoration, can be considered natural and contribute to enhancing naturalness.

Similarly, when considering whether real nature can be accessible to humans, some interviewees expressed the belief that human activities should be limited to the edges of real nature while preserving the core areas as inviolable and pure. Whereas the majority of greenspace users expressed a desire to engage with nature through light activities such as walking, playing, observing, and taking photos. This finding aligns with the finding that activities such as wandering, running, and taking photos in nature were rated highly as reasons for visiting nature. Most interviewees sought a certain degree of freedom in their interactions with nature while emphasizing the importance of minimizing any detrimental impact on the natural environment. The concept of balance between human activities in nature and the avoidance of excessive intervention emerged as a recurring theme in the research. This concept represents a delicate equilibrium between the desire for individual autonomy in wild nature and the recognition of nature's intrinsic autonomy. It is this emphasis on balance that potentially motivates the value attributed to wild nature (Ridder, 2007).

ii) The role of scale

Another significant factor influencing the definition and description of nature is the concept of 'scale'. Both the questionnaire and interview results indicate that a larger scale with a broad view was often considered a characteristic when defining and describing nature.

Visual scale, as a perceptual unit, pertains to the perception of landscape rooms, visibility, and the extent of openness, which was introduced in a synthetical review of analyses of visual landscape character (Tveit, Ode and Fry, 2006). Various indicators, such as the proportion of open land, viewshed size, and depth of view, have been suggested in visual scale research (Ode, Tveit and Fry, 2008). For example, vistas provide visual access on a larger scale (Kaplan and Kaplan, 1989). In the context of landscape studies, scale is often referred to as 'extent'. It can be defined as the largest scale perceived by an organism (Wiens, 1994) or the range at which a relevant object can be distinguished from a fixed vantage point (Kolasa and Rollo, 1991).

The appreciation of larger scales and area extents can be attributed to the generation of heterogeneity in the environment. Even if only the size of the habitat patch is altered, larger scales have the potential to transform homogeneity into heterogeneity (Kolasa and Rollo, 1991). In other words, larger scales and broader views provide greater diversity in plant communities and spatial types. This finding is supported by earlier research on urban landscapes, where a Riverside area with an average size of 990.9m^2 was considered more natural than a Berwyn area with an average size of 424.2m^2. The Riverside area had larger patch sizes and greater diversity in landscape structure, as well as in the composition and size of the woody vegetation (Crow, Brown and De Young, 2006). A similar finding can be found in forest research, that large forested areas spanning thousands of hectares have greater resilience to natural disturbances and are better equipped to preserve

habitats and species in a favourable state of conservation compared to smaller systems (Schnitzler, 2014). Within these heterogeneous ecosystems, people can appreciate the mystery of nature through the presence of numerous patches and topographic variability (DelaFuente de Val, Atauri and de Lucio, 2006). Additionally, they can recognize the ecological value associated with the flow of energy, materials, and species among large-scale heterogeneous ecosystems (Nassauer, 1997).

iii) The role of vegetation

In addition to human intervention and scale, the visual characteristics of vegetation play a significant role in the way our participants defined nature. We found that the concept of real nature often evokes images of tropical forests, characterized by lush visuals, dense canopy cover, diverse vegetation structures that are difficult to access, and a minimally ordered form. These findings are consistent with research conducted by Zoderer *et al.*, (2020) on public wilderness representations, which identified wilderness as areas that are either excessively overgrown with vegetation or too rugged for easy human access. Previous research also suggests that vegetation with fewer straight lines and a less manicured appearance is often perceived as natural (Colley, Brown and Montarzino, 2016), and tall and dense vegetation structures are associated with naturalness (Lamb and Purcell, 1990).

In our study focusing on the perception of natural vegetation among 200 greenspace users who are immersed in nature, the questionnaire survey identified three main perceptual components: 'attractiveness and restorativeness', 'complexity and disorder' and 'danger and boredom'. Analysing the overall impression scores of natural vegetation, it was found that the overall score had a positive correlation with attractiveness and restorativeness. This means that participants rated natural vegetation highly when they perceived it as attractive and restorative. The interview data further supported the notion that the attractiveness and restorativeness of natural vegetation can be attributed to factors such as complex vegetation structure, rich colours, and the refreshing sensations experienced in natural environments. This perception of vegetation is also positively related to individuals' nature-relatedness, consistent with the finding that individuals who are more connected to nature tend to experience more positive affect, vitality, and life satisfaction, which contributes to their high appreciation for natural vegetation (Capaldi A., Dopko L. and Zelenski, 2014) and their transcendental and awe-inspiring experiences in wild nature (Davis and Gatersleben, 2013).

Perceiving natural vegetation as complex and disorderly was negatively associated with participants' overall impression. This negative association could potentially be attributed to these two factors being treated as a single dimension throughout the Principal Component Analysis (PCA). When analysing the separate factors of 'complexity' (which contained characteristics of 'complexity' and 'denseness') and 'disorder'(which contained

characteristics of ‘messiness’ and ‘less care for’), it was discovered that the overall impression of vegetation had a negative correlation specifically with the perception of ‘messiness’ and ‘less cared for’ in natural vegetation communities.

Interestingly, the interview data did not align with our questionnaire data, as most interviewees recognized the complexity of natural vegetation communities based on species diversity and layered structure. They also acknowledged the rationale behind disorder and messiness in natural vegetation communities and did not express negative evaluations of vegetation. In Nassauer’s earlier research (1995), the concept of a ‘messy ecosystem’, both in terms of its ecological function and its disorderly appearance, was found to be challenging for the public to readily recognize and accept. The inconsistency between the quantitative and qualitative results could potentially stem from socio-demographic factors, such as educational qualifications and occupation, playing a significant role in influencing different responses. Notably, the average educational qualification of the interviewees was higher than that of the questionnaire participants in our research. This could have resulted in a more positive response and a greater acceptance of the messy and disorderly natural vegetation structure and appearance. This aligns with prior research that has linked education to attitudes towards landscape messiness (Buijs, Elands and Langers, 2009; Li *et al.*, 2019). Another plausible explanation for the inconsistency is that interviewees might have been more inclined to focus on the positive aspects of nature rather than making negative evaluations of natural vegetation.

The presence of danger and boredom in natural vegetation did not significantly correlate with participants’ overall impression. Notably, greenspace users appeared to display an awareness of potential hazards within a broader societal context, rather than solely emphasizing the perceived dangers associated with the vegetation itself. Further exploration of this aspect will be undertaken in Section 5.1.3.

Despite greenspace users recognizing that the aesthetic richness of vegetation in the BM nature reserve might be comparatively subdued when compared to other picturesque locations, their experience was not characterized by boredom. This resistance to boredom could be attributed not only to the inspiring and adventurous behaviours that nature often invokes as previously discussed (Kaplan and Kaplan, 1989), but also to the encompassing scale and grandeur of the entire natural environment, extending beyond the scope of vegetation alone. This broader context can evoke a sense of awe and fascination. Earlier research in the field of environmental psychology has expounded on the concept that these feelings of awe and fascination stem from individuals perceiving themselves as diminutive and unimportant within the vastness and magnificence of the natural world (Stokols and Altman, 1991; Gallagher, 2007). These inherent qualities embedded within natural landscapes could effectively deter the onset of feelings of boredom.

Furthermore, it is pertinent to acknowledge that no statistically significant relationship surfaced between the perception of danger and boredom within natural vegetation and individuals’ level of nature-relatedness in the

present study. This deviation from prior investigations that centred on the interconnectedness with nature, wherein significant negative relationships were observed between sensations of boredom and disturbance (Davis and Gatersleben, 2013), could potentially be attributed to the distinct measurement scales employed in the respective research endeavours. The previous study employed the Connectedness to Nature Scale (CNS), while the current study employed the Nature Relatedness Scale (NR-6) as its assessment tool.

iv) The role of diversity and dynamic processes

The definition of nature often underscores the paramount importance of landscape diversity and the dynamic interplay of processes. In our interviews, this emphasis on diversity was readily apparent as participants recurrently highlighted a medley of landscape types, ranging from majestic mountains to serene water bodies and picturesque agricultural vistas. Additionally, the profusion of wildlife and flora species was a recurring theme, accentuating the profound influence of variety within nature. The dynamic processes integral to the natural world were also frequently described by our interviewees. These descriptions encompassed an array of natural phenomena, including the restoration and vitality intrinsic to nature itself, as well as the captivating shifts that transpire across seasons.

This viewpoint resonates with a study where participants were tasked with documenting three positive observations from nature daily. The subsequent content analysis of responses from 65 participants uncovered ten prominent themes, of which six were intrinsically linked to diversity (Richardson, Hallam and Lumber, 2015). These themes included vibrant hues and the intrinsic processes of nature, such as the blossoming of flowers and the ever-changing weather patterns. Furthermore, within a study centred on roadside landscapes, participants voiced a distinct preference for diverse habitats and vegetation types along roadsides. This preference for a heterogeneous and varied landscape over a monotonous one was indicative of an innate appreciation for diversity (Akbar, Hale and Headley, 2003).

v) The role of sensations and childhood nature experience

In the collective comprehension of nature, our findings underscore the considerable significance interviewees place on the sensations of freshness and their childhood recollections immersed in nature. The sensory experience of nature encompasses various dimensions, including visual perceptions of the colour spectrum ranging from green to blue, auditory experiences of bird songs and the rustling sound of the wind, olfactory sensations of fragrant herbs, and tactile experiences of comfortably moderate humidity and slightly cool temperature. This finding aligns with a previous study that investigated individuals' perceptions of the good

things in nature, where sensory experiences emerged as the most frequent theme, mentioned by 16.8% of participants when asked to identify three positive aspects of nature (Richardson, Hallam and Lumber, 2015).

Regarding childhood nature experiences, some interviewees vividly depict their memories and encounters with nature when describing their perception of it. For example, One interviewee (F, 40-49, EXPO 21) who was a practitioner in an environment-related discipline described 'Nature is the thing that makes me feel so close to it. I think my first image is the scene from my childhood…a path to the end of our village…' and then gave six specific examples of childhood nature experiences with a delightful and nostalgic tone. These examples depict daily scenarios such as catching fish in the river, picking vegetables in the garden, identifying species of some unknown plants in the wild and so on. A study on visions of nature describes that the adherence to a wild or arcadian image of nature in adulthood may be linked to more intense and direct experiences in nature during childhood (VandenBorn *et al.*, 2001). These two factors, sensations and childhood experiences may interact with each other, as the sensory elements contribute to the overall recognition and perception of nature by evoking positive and nostalgic emotions associated with childhood encounters in natural environments.

5.1.3. Concerns about nature

This section focuses on negative perceptions of and concerns about nature, examining the possible underlying reasons behind these negative perceptions and concerns. Our questionnaire and interview results both indicated that among 200 participants and 10 interviewees in the BM nature reserve, concerns about 'unknown dangers and illegibility' and 'litter and crowds' were more prevalent than concerns about 'unkempt dense vegetation'.

Our findings highlight users' heightened attention to potential dangers and unfamiliarity in natural environments. Concerns over 'getting lost' and encountering 'potentially dangerous animals or poisonous plants' stand out prominently. The absence of human influence in nature is closely intertwined with the existence of unknown dangers and illegibility. This perception often evokes thoughts about mortality, in contrast to the more controlled environment of human-intervened areas, which are perceived as safe, open and familiar (Koole and Van den Berg, 2005). Research on Chinese natural attractions echoes this, indicating visitors' concerns about the lack of directional signage (Xu *et al.*, 2013), which can be seen as a necessary human trace.

Litter and crowds are additional concerns that people associate with nature in both questionnaire and interview results, as they are seen as consequences of human intervention that go against the perceived definition and description of nature. The presence of litter is often seen as a quality indicator of the natural environment, as introduced in a study of various types of natural greenspace in the UK (Wheeler *et al.*, 2015)

and a study of streetscape in the Netherlands (VanDillen *et al.*, 2012). This, in turn, creates feelings of discomfort and insecurity due to the lack of cleanliness and deters individuals from utilizing greenspaces, hampering the potential benefits to their health and well-being, as mentioned in the existing literature exploring the relationship between health and greenspace quality in the UK (Brindley *et al.*, 2019). As these studies mainly focus on public health, which is not a primary aspect of our research, future work could consider whether environmental quality in terms of health is related to concerns in nature.

Perceptions of crowding can also influence people's concerns about nature. The perception of crowding was considered to interfere with individuals' primary goals when visiting natural environments in research about urban forests in Austria, as users' personal minimum space requirements were violated by others (Arnberger and Haider, 2005). In research conducted on Mediterranean mountains, it was found that nature visitors whose primary motivation was to have a close connection with nature were more likely to perceive crowding, as they sought solitude and the uninterrupted experience of being immersed in (Luque-Gil, Gómez-Moreno and Peláez-Fernández, 2018). In China, where the population is dense and the per capita green space area is low, creating an uncrowded greenspace and eliminating concerns about crowding is not easy. Thus, applying the prospect and refuge theory (Appleton, 1975) to meet basic human psychological needs and protect personal minimum space requirements in greenspace is a significant consideration in future landscape design.

Our questionnaire findings suggest that greenspace users express lesser concerns about 'unkempt dense vegetation' compared to the other two aspects. This aligns with the interview results, where no interviewees actively brought up concerns about vegetation. However, existing literature indicates that dense vegetation could contribute to unknown dangers and illegibility (Kaplan and Kaplan, 1989; Koole and Van den Berg, 2005), particularly affecting visual access (Herzog and Kropscott, 2004).

The perception of unknown dangers and illegibility in nature is often linked to the inherent characteristics of density and complexity in vegetation structure. The spatial arrangement and treatment of edges within natural environments can significantly shape the perception of personal safety. A study conducted in the UK about the perception of safety and preference for the woodland edge and space found that natural shrubby edge treatments are seen as less safe than less dense ones (Jorgensen, Hitchmough and Calvert, 2002). In particular, dense vegetation may restrict sightlines and visibility, thus affecting individuals' sense of security. This aspect is particularly relevant for elderly individuals, such as BM 01, who may have heightened concerns about personal security in nature. Previous studies have shown that ageing individuals may experience a sense of frailty, reduced mobility, and an increased sense of vulnerability, which can contribute to their concerns about personal safety in natural settings (Jorgensen and Anthopoulou, 2007). However, despite evoking a sense of danger, dense vegetation in the case of forts creates a mysterious landscape that is popular among people due to its allure (Pardela *et al.*, 2022) and inspires exploratory and adventurous behaviours (Kaplan and Kaplan,

1989). This could explain why there is no correlation between the overall impression score of the vegetation and the concerns of ‘unknown dangers and illegibility’ and ‘unkempt dense vegetation’ in nature in our questionnaire results.

5.1.4. The role of Chinese culture

In our research, four factors, namely Chinese calligraphy, literature, poetry, landscape painting, Chinese traditional gardens, and traditional philosophical thoughts, were summarised as elements of Chinese culture. We found that traditional Chinese culture did indeed influence our participants (n=1600) to a certain degree in their interest in nature, particularly with regards to the impact of ‘Traditional Chinese Gardens’, which exhibited relative significance. Notably, in our research on interest in nature, personal experiences play a more significant role than Chinese culture. These experiences include childhood memories of outdoor play, travel experiences, and individual interests in wildlife and plants, which will be further discussed in Section 5.4.

Our interviewees further shed light on the influence of Chinese traditional culture on their interest in and perception of nature. They mentioned being influenced by their surroundings, appreciating traditional gardens, learning about traditional culture in school, and considering traditional culture as a cohesive whole rather than identifying specific forms or aspects. The findings suggest that a singular, specific form of traditional culture has a limited impact on the view of nature, as participants often perceive different cultural forms as interconnected. Certain literature directs attention towards Chinese traditional philosophical thoughts that shape modern urban landscapes, spirit, and aesthetics (Li and Wang, 2008; Mao, Wang and Wu, 2021; Yang, Hou and Cao, 2021). However, our research could not confirm this, potentially due to the limitation in our sample size.

Some of our interviewees believed that their innate love for nature was influenced by traditional Shanshui culture without conscious training or education. This finding suggests that ordinary individuals unconsciously recognise the value of Shanshui culture to varying degrees. This mirrors the association between love for nature and love for God in Western traditions, indicating the profound theistic origins of these attitudes (Hargrove, 1989).

Additionally, demographic variations are evident in the cultural impact on interests in nature. The questionnaire data suggests that the older generation’s interest is largely influenced by traditional Chinese culture, whereas the younger generation's interest may stem more from personal will and experiences. This is further supported by evidence that users of city parks predominantly frequented by the elderly tend to attribute their interests in nature to traditional cultural influences compared to those at the other two research sites.

Although numerous Chinese studies recognise the importance of traditional culture in contemporary China and assert that Chinese Shanshui culture significantly influences Chinese landscape design (Liao, 2020; Mao, Wang and Wu, 2021; Yuan, 2022) and current landscape aesthetics (Chen, 2009, 2016; Li, 2019), these discussions tend to be framed within broad design and planning concepts or national governmental perspectives. Yet, there is a gap in research that explores the functionality and mechanisms of Chinese culture from ordinary people's perspectives, providing data and evidence. Thus, our research stands as a pioneering effort to investigate the relationship between public attitudes and Chinese culture, particularly concerning interests in nature and perceptions of nature.

5.1.5. Summary for Research Question 1

In summary, our investigation into how Chinese greenspace users perceive, define, and recognize 'nature' has revealed several key insights. Chinese individuals exhibit comparatively lower rates of nature visitation when compared to countries such as the UK, Finland, and Norway. Their visits to nature are primarily driven by leisure activities, with preferences for natural settings like mountains, forests, rivers, and coasts, evoking a sense of nature's grandeur and power. However, the demand for greenspaces remains strong, and there exists a belief that nature's essence can be integrated into daily life.

The primary factors influencing how our participants recognize nature are the notions of minimal human intervention and large scale with the experience of vast, open views. The presence of dense, complex, and seemingly disordered vegetation, along with diverse wildlife and dynamic ecological processes, further contributes to their understanding of nature. These factors interplay with each other and correspond with drivers identified in a study focused on representations of wilderness (Zoderer *et al.*, 2020).

Concerns about nature predominantly revolve around 'unknown dangers and illegibility' as well as 'litter and crowds'. These concerns underscore the significance of necessary human trace, environmental quality, and the preservation of users' personal space. Interestingly, our participants tend to appreciate 'unkempt dense vegetation' and highly evaluate it when they perceive it as visually appealing and restorative in authentic natural settings.

Traditional Chinese culture notably impacts the older generation's perspectives and interests in nature, while the younger generation is more influenced by personal experiences. When evaluated individually, various facets of Shanshui culture, such as paintings or philosophical thoughts, exhibit limited influence. Instead, most individuals tend to perceive Shanshui culture as an interconnected whole. Significantly, the public's recognition of the value of Chinese culture often occurs unconsciously.

5.2. Research Question 2:

How do Chinese greenspace users recognise and evaluate 'urban greenspace'?

In the preceding section, the study delved into how Chinese greenspace users recognize, describe, and perceive 'nature' in a general natural context. However, it was observed that the notion of 'nature' could differ significantly when applied to an urban context. Some of our interviewees emphasized that achieving the presence of untamed, primitive wilderness or vast natural landscapes in our daily urban environment is neither attainable nor suitable. In urban settings, the concept of 'urban nature' is often perceived as 'nearby nature' (Kaplan and Kaplan, 1989) and 'mundane nature' (Newman and Dale, 2013). These terms collectively refer to natural elements and surroundings that are conveniently accessible and exist in close proximity to human society. The latter concept builds upon the former and places greater emphasis on the ecological systems' inherent value and the services they provide.

Therefore, the primary focus of this research inquiry lies in urban greenspaces (also referred to as urban nature) within the urban context. This term encompasses areas within urban environments characterized by the presence of natural elements. These spaces can exhibit a variety of sizes and forms, ranging from small pocket gardens and larger urban parks to green corridors. Moreover, they encompass diverse planting designs, including formal arrangements, nature-inspired designs, and preserved wild areas.

This research question seeks to explore the interplay between the urban environment and the concept of 'nature'. It aims to investigate how urban greenspace is assessed and perceived by those who use it, providing essential background for the subsequent inquiry into naturalistic planting in urban areas. Additionally, the study will delve into the beliefs and values connected to urban environments and the significance of environmental preservation in the context of urban development.

5.2.1. Recognition of the relationship between the 'city' and 'nature'

The interviews conducted during our study unveiled three distinct themes that surfaced from the definitions of 'city' provided by Chinese greenspace users. Understanding these definitions can offer valuable insights into comprehending general attitudes towards urban greenspaces and the preferred characteristics of greenspaces within urban contexts.

The first theme underscores the perception of a city as a locus of human civilization and care. This aligns with the developmental concept and infrastructural features associated with urban areas, setting them apart from underdeveloped rural regions and villages. Urban spaces often showcase advanced technologies, reflecting a sense of progress and a tangible demonstration of what can be termed as 'cues to care' (Nassauer, 1995b). The

second theme emphasizes that a city is a place where populations densely gather. This highlights the concentration and gregariousness of the Chinese population and their activities within a city setting, driven by the desire for convenience and efficiency in daily life. It is worth noting that some interviewees pointed out that the Chinese context differs from non-capital cities in Western countries, as Chinese cities need to accommodate larger populations, which should be considered when defining the concept of 'city' within the Chinese context. The third theme underscores that a city represents national or regional identity, serving as a symbol of the unique characteristics, history, and cultural heritage of a specific area. Some interviewees emphasized that a city needs to possess its own distinctiveness to differentiate it from other regions. Additionally, it is important to acknowledge that this research was conducted in Beijing, the capital city of China, and many interviewees defined 'city' considering its special position. In the case of Beijing, the city also serves as a façade to showcase national identity, culture, and the country's power to other nations.

These themes from above are generally consistent with the main characteristics of the definition of 'city' in the contemporary urban geography of the West, including (1) a predominantly non-agricultural workforce, (2) high population density and concentration, and (3) a distinctive cityscape comprised of densely built structures and architectural styles that set it apart from rural settlements in terms of physical appearance (Xue, 2010). Based on the three themes identified in the interviews, three potential preferred characteristics for urban greenspace can be generated. These include the presence of 'cues to care', which signifies a well-maintained and cared-for environment, the maximization of various types of greenspaces to cater to and fulfil people's diverse needs, and the incorporation of cultural symbols, national power, and identity that reflect the unique characteristics and cultural heritage of the city.

When investigating the intricate relationship between urban context and nature, our study approached the topic from two distinct perspectives in order to gain a comprehensive understanding of participants' responses and to facilitate comparison between their viewpoints. These perspectives encompassed a third-person objective reflection on the urban-nature relationship and a first-person subjective evaluation of attitudes towards urban nature.

In response to the question of 'whether the city should be mixed with nature', in other words, whether urban areas should be interwoven with nature or maintained as separate entities, the interviewees exhibited diverse stances. Notably, the ratio of those advocating for a mixed approach to those favouring separation was approximately 2:1, indicating that a considerable majority recognized the significance of incorporating nature within urban settings. Around one-third of interviewees expressed a preference for maintaining a separation between the city and nature. Their rationale lies in perceived disparities in urban development priorities and concerns about potential resource competition and inefficiencies in co-development. From their perspective, cities are primarily designed to cater to human populations rather than wildlife or ecosystems.

However, when questioned from a first-person viewpoint, 'are you willing to see a natural environment like here, or something approximating to here in the urban area' during their visit to the BM nature reserve, more than half of the interviewees displayed an uncertain attitude towards the integration of nature in cities. Some did not express a preference, while others voiced both positive attitudes and concerns about implementation challenges which will be discussed in the following section. On the other hand, a significant proportion exhibited a decidedly positive attitude, underscoring the advantages and benefits of urban nature.

The variation in responses to the query regarding the interplay between urban areas and nature could be attributed to the change in perspective. Generally, many individuals consider having more nature and greenspace in urban areas as a beneficial and 'correct' approach, influenced in part by supportive governmental environmental policies and requisite environmental education. However, when confronted with specific scenarios and personal attitudes, the support rate diminishes as practical concerns come to the forefront. This phenomenon aligns with the notion of 'Not in My Backyard' (NIMBY) (Pajo, 2007; Nassauer, Wang and Dayrell, 2009; Liu and Mu, 2016), a paradoxical stance where individuals may support certain projects in theory but oppose their implementation in their immediate surroundings. In the case of greenspace users, while they may comprehend the significance of integrating nature in urban contexts and recognize its advantages, their personal preferences and willingness might veer towards locating nature away from their immediate living or working environments. Hence, comprehending both the benefits and challenges perceived by greenspace users is pivotal for advancing this research.

5.2.2. Greenspace users' attitudes towards urban nature

During our interviews, the discussions often revolved around the psychological well-being benefits associated with urban nature. Many interviewees emphasized nature's role in restoration and providing refreshing experiences. Moreover, they highlighted the positive ecological impacts of urban nature, such as improved air quality, bird attraction, and flood mitigation. However, it is noteworthy that recognition of physical benefits, like spaces for physical activity, and other indirect advantages, like contributing to higher property prices, were relatively limited among the interviewees. This implies that the primary considerations for most greenspace users are the enhancement of human well-being and the ecosystem services provided by urban nature. This finding aligns with prior research which emphasized the importance of human well-being (Kothencz et al., 2017; Knez et al., 2018) and ecosystem services (Sung, 2013; Soulsbury and White, 2015; Lindén *et al.*, 2023) as key benefits valued by greenspace users. Interestingly, one interviewee introduced a different perspective by discussing the potential impact of urban nature on the surrounding housing prices, rather than focusing solely on the direct benefits of urban nature itself. This further implies that the perception of urban nature primarily serving human populations is reinforced from various angles. It is important to note that the limited mention

of physical activity and other benefits related to greenspaces in the interviews might stem from the specific sample of interviewees and their backgrounds, and thus, might not fully reflect the overall significance of these factors.

The findings of this study also underscore the challenges and difficulties associated with integrating nature into urban environments. Among the challenges identified by interviewees, 'achieving large-scale implementation, high costs', and its potential resource competition were emphasized. For example, EXPO 17 highlighted that the large scale of dense natural vegetation that encroached upon the limited urban space. These findings align with existing literature on conflicts between urban development, agricultural production, and ecological preservation in Xuzhou, China, underlining the role of governmental policies in addressing these challenges (Lu *et al.*, 2019; Liu *et al.*, 2022).

The issue of 'public acceptance' emerged as a significant challenge in urban nature planning and design. Some interviewees expressed concerns about others' differing roles and motivations leading to distinct attitudes and expectations regarding public urban nature. This aligns with research on European urbanites' attitudes towards urban greenspaces, where positive nature-related values, recreational needs, and cleanliness preferences influenced preference for tall-grass and short-cuts lawns (Lampinen *et al.*, 2021). Greenspace managers also recognize that various stakeholders may hold diverse considerations and preferences when integrating nature into cities, including human resources, location context, and costs (Hoyle *et al.*, 2017). Notably, studies have shown that informing the public about the benefits of nature greenspace can help increase their acceptance and change their preferences, with such spaces being more appreciated than formal ones (DelaFuente de Val, 2023).

The challenge of 'lacking cultural symbols and place identity' was also acknowledged. Interviewees expressed that urban nature, unlike architecture or sculptures, may lack distinctiveness from place to place, thus struggling to establish unique cultural symbols and city identity. This aligns with previous research on migrants' experiences, emphasizing the significance of forging meaningful connections between nature and the local context to foster a sense of place attachment in urban greenspaces (Rishbeth, 2016). For instance, our interviewees suggested using the lotus species widely in Beijing Lotus Lake Park (LLP) as a strategy to enhance the connection and identity of LLP, differentiating it from other urban parks in Beijing.

Furthermore, concerns about 'wildlife harm and administrative difficulties' were also raised. The apprehensions regarding wildlife may increase due to a perceived lack of human control. This concern aligns with systematic reviews on human-wildlife conflicts, highlighting the need for effective wildlife population management to mitigate such conflicts in urban greenspaces (Soulsbury and White, 2015; Basak *et al.*, 2023). Moreover, enhancing childhood nature experiences could alleviate fears of wildlife, as demonstrated by a study

in Malaysia, where positive childhood experiences were associated with a greater willingness to coexist with wild animals (Mohamad Muslim *et al.*, 2018).

5.2.3. Beliefs and values related to the urban environment

The unwavering belief in the significance of environmental protection over economic development, observed among both the 1,400 participants from LLP and the EXPO, regardless of their research place and the various types of planting settings examined, signifies a resolute dedication to promoting sustainable urban growth and enhancing ecological conditions. This shared value reflects the growing awareness of the urgent need to balance economic development with environmental conservation in our research. Meanwhile, It is in parallel with earlier findings which recognised the vital role that urban greenspaces and urban nature play in enhancing urban liveability and well-being (Randrup *et al.*, 2020; Krapez, Hughes and Newsome, 2021). These findings highlight the potential for collective action and public support in advocating for greener urban spaces and environmentally conscious policies.

Furthermore, our questionnaire findings also suggest that the experience of being in naturalistic planting settings may positively influence individuals' belief in the possibility of replicating authentic natural elements in urban environments. Participants surveyed in urban parks, particularly those exposed to naturalistic plantings, displayed a stronger belief in achieving this goal compared to greenspace users surveyed in wild nature. Actually experiencing naturalistic plantings seems possible to provide individuals with tangible examples of how real nature can be integrated into urban spaces in a harmonious and aesthetically pleasing manner. This firsthand encounter with naturalistic designs in real projects may dispel any doubts and concerns individuals may have about real nature. as described in research about designed urban greenspaces, users may see naturalistic designs with a certain degree of human care as 'a relatively tamed, managed and sanitised way' of wild nature (Hoyle, Jorgensen and Hitchmough, 2019).

Additionally, the individual's perception and definition of 'something approximating real nature' may extend beyond what was discussed in the last section regarding the perception and definition of 'nature'. When considered in an urban context, it is not limited to specific characteristics such as minimal human intervention, large scale, dense, complex, and disordered vegetation structures, and so on. The understanding of 'something approximating to real nature' in urban environments may involve a more flexible and adaptable approach taking into account the unique challenges presented by urban living, such as scale, costs, and resource competition issues as discussed above, and also considering the preferred characteristics which will be presented in the next section to evoke a sense of nature in urban design.

5.2.4. Summary for Research Question 2

Building upon the insights gained from Chinese greenspace users' perceptions, definitions, and recognition of 'nature', this research question endeavours to extend its focus to the urban context. This includes delving into the conceptualization of 'urban', exploring the intricate relationship between urban and nature, assessing attitudes towards urban nature encompassing identified benefits and challenges associated with establishing nature within urban settings and probing into the beliefs and values associated with the urban environment.

This study, through its interviews, discerns three principal themes that Chinese participants associate with the definition of a 'city': embodiment of human civilization and care, dense population gathering, and representation of national or regional identity. Our research indicates that the majority of participants lean towards advocating the amalgamation of nature with urban spaces and are supportive of the idea of introducing nature into the urban environment. However, there exists a subtlety in their attitudes when considering the matter from different perspectives – a third-person objective standpoint and a first-person subjective outlook. This phenomenon parallels the concept of 'Not in My Backyard', where preferences for certain initiatives might shift when they directly affect personal surroundings. These nuances in attitude can be attributed to the extent of recognized benefits and challenges.

The highlighted benefits of urban nature predominantly centre around its psychological and ecological advantages. The focus is primarily on benefits like enhancing psychological well-being and the ecological improvements that urban nature can bring, such as cleaner air, bird attraction, and flood control. However, mentions of physical benefits and other advantages are relatively limited. Conversely, challenges in integrating nature into urban environments are multifaceted. They encompass the hurdles of achieving large-scale, challenging implementations with associated high costs, grappling with the complexity of public acceptance, addressing the lack of distinct cultural symbols and place identity in urban nature, and managing potential conflicts arising from wildlife presence.

Furthermore, our study uncovers a steadfast belief among participants in prioritizing environmental protection over economic development. Additionally, exposure to naturalistic planting settings emerges as a catalyst for augmenting individuals' belief in the feasibility of replicating genuine natural elements in urban domains. This, in turn, fosters a more supportive attitude towards establishing a sustainable urban nature. The concept of 'high impact, low input' greenspaces gains prominence in this context, aiming to enhance urban livability and overall well-being.

5.3. Research Question 3:

How do greenspace users perceive naturalistic planting in urban areas?

The third question of this research was primarily focused on delving into the perceptions and attitudes of greenspace users concerning naturalistic planting within urban areas. This investigation involved a comparative analysis of both Chinese conventional planting characterized by single or simplified layers, high openness and a well-pruned tidy appearance in urban environments, as well as the natural vegetation communities found in the authentic nature reserves. Additionally, this question sought to identify the most preferred key planting characteristic of naturalistic planting among the participants. By examining these preferences and perceptions, this research provides valuable insights into the acceptability and desirability of naturalistic planting in urban contexts and its potential role in enhancing urban greenspaces.

5.3.1. Comparison between Naturalistic Planting (NP) and Conventional Planting (CP)

Previous studies have extensively discussed the various benefits (Hitchmough and Woudstra, 1999; Hitchmough, 2017a; Taylor, 2017) and aesthetic characteristics (Dunnett, 2019; Hoyle, Jorgensen and Hitchmough, 2019) associated with NP, as highlighted in the literature review. An extensive research review has highlighted benefits encompassing aspects such as air quality, physical activity, social cohesion, and stress reduction, which result from engaging with nature (Hoyle, 2020). In a recent doctoral study, the aesthetic characteristics of naturalistic planting were explored, revealing that the preferred attribute is the integration of multi-layered species with randomized spatial arrangements, as observed in Malaysia (Baharudin, 2020). However, it is important to highlight the dearth of research within the Chinese literature that specifically delves into the perception and preference of naturalistic planting in urban areas, particularly when making a clear distinction from the established Chinese conventional planting practices, as elucidated in the studies mentioned in Section 2.3.4 (Jim and Chen, 2006; Liu, 2010; Wang, Zhao and Liu, 2016). Conventional planting in China, as discussed in the literature review, originally drew inspiration from nature but later evolved to prioritize tidiness and orderliness, distinct from the naturalistic and irregular approach seen in traditional Chinese gardens.

Interestingly, the findings from this study indicate that despite being a relatively new design technique, naturalistic planting is perceived as equally familiar as Chinese conventional planting by participants, regardless of the scenarios or scale in urban parks or designed show gardens. However, while the familiarity may be similar, the results still suggest that participants can recognize distinct differences in other planting characteristics, such as restorativeness, cost, messiness, and more. These findings align with earlier comparative research conducted in the UK, which investigated the distinctions in perception between NP and

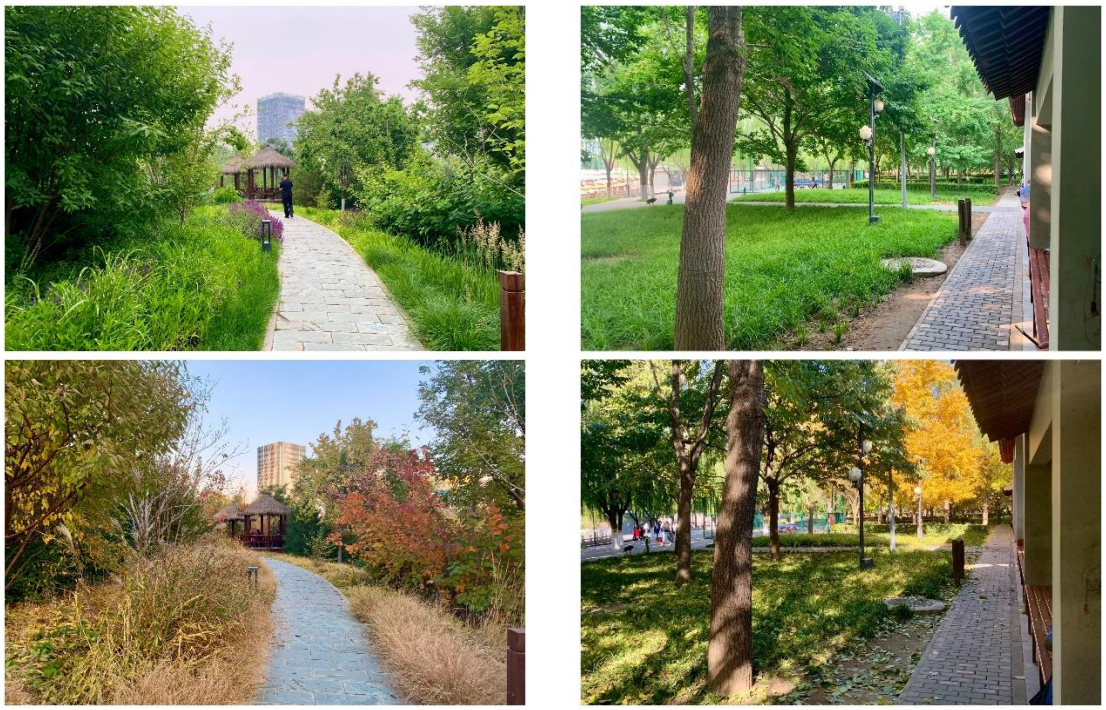
formally designed planting. This research revealed that the public attributed both shared and distinct values and benefits to the various types of plantings (Özgüner and Kendle, 2006).

In preliminary findings, regardless of the scale in urban parks and show gardens, naturalistic planting is generally perceived as more 'natural, restorative, ecologically valuable, and attractive' but less 'exquisite, careful' and with lower 'complexity and density' compared to conventional planting. Interestingly, there is no difference in the overall impression score of vegetation between naturalistic planting and traditional planting, possibly due to the neutralization of conflicting results obtained in urban parks and show gardens. A similar outcome was observed where respondents' preferences were impacted by distinct green space contexts, specifically public parks versus private residential gardens (Harris *et al.*, 2018). This underscores the necessity to interpret and discuss the results separately in accordance with the particular scenarios or scales involved.

i) Urban park scale: Lotus Lake Park – Comparison of reactions to Naturalistic Planting (NP) in Woodland Park and Conventional Planting (CP) in Traditional Park

Figure 5.1 Photos of NP (left) in Woodland Park and CP (right) in Traditional Park in Lotus Lake Park

(Left-top: NP in summer, Left-bottom: NP in autumn; Right-top: CP in summer, Right-bottom: CP in autumn)



The investigation comparing Naturalistic Planting (NP) and Conventional Planting (CP) in Lotus Lake Park (LLP) in Beijing city centre (Figure 5.1) revealed that participants perceived NP as more attractive and restorative than CP. This positive perception of attractiveness and restorativeness is closely associated with the higher overall impression score of vegetation. The overall impression score of NP was significantly higher than that of CP, indicating a preference for this type of planting among Chinese greenspace users in urban park settings. These findings align with previous research that emphasizes the positive effects of naturalistic designs on human well-being and emotional responses (Muratet *et al.*, 2015; Lhomme-Duchadeuil, 2018; Maple and Morris, 2018). This finding is also in parallel with research conducted in the UK, where site satisfaction was notably linked with the perception of species richness (Southon *et al.*, 2018).

Interestingly, there were no significant differences between NP and CP in relation to perceptions of 'ecological values, familiarity, and policy fitness', 'complexity and disorder' and 'insecurity' (for detailed factors, refer to Table 4.38). This indicates that NP and CP were viewed and perceived similarly in terms of the aforementioned characteristics within the urban park context. This finding aligns with research conducted in urban parks in France (Muratet *et al.*, 2015) and Western Australia (Krapez, Hughes and Newsome, 2021), which found that urban park users may not be fully aware of some of the ecological values related to diverse vegetation communities, but they are more attentive to its visual impact. Despite this lack of awareness, they can still perceive a greater sense of naturalness in naturalistic plantings. These findings highlight a knowledge gap and the need for environmental education, which is also applicable to our research conducted in China.

Additionally, the perception of complexity and disorder in NP was observed to be similar to that in CP, which is consistent with a survey conducted in Malaysia where different levels of plant diversity did not result in distinguishing perceptions of disorder and messiness (Baharudin, 2020). Similarly, a study in the UK also suggested that perceived complexity does not necessarily correlate with the perception of naturalness (Hoyle, Jorgensen and Hitchmough, 2019). Nevertheless, another research project in the UK indicated that people can more or less accurately perceive the complexity of vegetation in urban greenspaces (Fuller *et al.*, 2007). The varying outcomes concerning the perception of complexity and disorder might be influenced by cultural and contextual factors, as well as individual demographic and background factors like educational qualifications, occupation, and childhood experiences in nature. These differences warrant further exploration in diverse settings to attain a comprehensive understanding.

ii) Show gardens scale: EXPO Beijing – Comparison of reactions to Naturalistic Planting (NP) in the 'New Silk Road' Garden and Conventional Planting (CP) in Beijing Garden

Figure 5.2 Photos of NP in the 'New Silk Road' Garden and CP in the Beijing Garden at EXPO

(Top: NP in autumn; Bottom: CP in autumn)

The findings from the study comparing naturalistic and conventional plantings in the small-scale designed show garden offer valuable insights into greenspace preferences in display-oriented urban areas. Interestingly, unlike the results in urban parks where naturalistic plantings were preferable, participants rated the overall impression score of naturalistic plantings significantly lower than conventional plantings in the designed show garden. This observation aligns with previous research on garden types, suggesting that lush, abundant, and labour-intensive gardens are often perceived as more beautiful than natural, wild, ecological gardens

(VandenBerg and Winsum-westra, 2010). The differing preferences between the urban park and the designed show garden can be attributed to the different expectations and experiences sought by participants. In the urban park, participants may have been seeking a more natural and immersive experience, leading to a higher preference for naturalistic plantings that mimic wild and ecological landscapes. On the other hand, in the designed show garden, participants may have been drawn to the visual impact and abundance of lush plantings, aligning with the traditional aesthetics of Chinese gardens that emphasize beauty and opulence.

Participants perceived the NP in the 'New Silk Road' garden as having more 'ecological value, restorativeness, and policy fitness', as well as more 'disorder and danger', but less 'complexity, exquisiteness, and colourfulness' compared to the CP in Beijing garden (for detailed factors, refer to Table 4.45). Several factors may explain these results. As the survey was conducted in an exhibition setting (EXPO), participants might have had a higher level of knowledge and professional background in horticulture and landscape, leading to better recognition of the ecological value and environmental policy fitness of naturalistic plantings. Previous studies have indicated that participants with professional backgrounds are more likely to recognize ecological value (Özgüner, Kendle and Bisgrove, 2007; Dandy and Van Der Wal, 2011; Jiang and Yuan, 2017). Moreover, the small but open space in the show garden provided a larger view shed, resulting in a more holistic vision where planting patterns and colours were easily captured. View shed and its role in landscape perception have been documented in various studies (Germino *et al.*, 2001; Palmer, 2004; Ode, Tveit and Fry, 2008).

It is noteworthy that the two show gardens had distinct design emphases. The conventional garden primarily prioritized creating a striking visual impact and showcasing rare species, aligning with prevalent Chinese aesthetics. In contrast, the naturalistic planting garden centred on promoting sustainable ecological concepts and displaying innovative planting technologies (Figure 5.2). This divergence in design emphasis could provide a significant rationale for the observed variations in participants' perceptions of the scale of the show gardens.

Surprisingly, there were no significant differences in the perception of familiarity attractiveness and species richness between the two planting types. This suggests that the more ecological approach of naturalistic plantings could be a viable alternative to conventional planting in certain situations where a more natural and sustainable landscape is desired.

5.3.2. Comparison of reactions to real nature in Baihua Mountain Nature Reserve and Naturalistic Planting (NP)

Figure 5.3 Photos of real nature in Baihua Mountain Nature Reserve (left column), NP in Woodland Park (middle column)and NP in 'New Silk Road' Garden (right column)

(top row: summer, bottom row: autumn)

The findings of this study underscore the distinctive characteristics and values of Naturalistic Planting (NP) in both urban park (Woodland Park, WP) and show garden (New Silk Road Garden, NSR) settings when compared to genuine natural environments in Baihua Mountain nature reserve (BM). Our questionnaire results indicate that irrespective of the scenario or scale, NP received higher scores for vegetation-related aspects compared to Conventional Planting (CP) in terms of overall impression and characteristics such as perceived naturalness, restorativeness, and attractiveness. However, these scores were lower than those of real natural environments, as NP falls short of fully replicating the authenticity and complexity of true nature. This observation aligns with previous research highlighting the irreplaceable value of authentic natural settings (Kaplan, 1977; Keniger *et al.*, 2013; Soga and Gaston, 2016; Lenaerts *et al.*, 2021; Joye, Lange and Fischer, 2022).

When considering the scenario and scale, it becomes evident that the NP in urban parks garnered the highest overall impression score for vegetation, surpassing even real natural environments, whereas the NP in the show garden received the lowest score. This suggests that the NP is a viable and suitable planting approach for urban parks, striking a balance between exhibiting aesthetic value and imitating real natural environments. This discovery corresponds with a French study suggesting that the public yearns for more naturalistic landscapes as long as proper management is in place (Muratet *et al.*, 2015).

Regarding perceived naturalness and attractiveness, our questionnaire results reveal a consistent pattern: real nature scored significantly higher than NP in urban parks, followed by NP in show gardens. The inclination toward larger and more naturalistic greenspaces, indicated by the positive correlation between scale and perceptions, further underscores the importance of preserving and establishing expansive greenspaces that offer diverse flora and fauna. This inclination is in line with the notion that larger and more diverse natural areas are often regarded as ecologically valuable and aesthetically pleasing (Nassauer, 1997; VandenBerg and Winsum-westra, 2010).

Interestingly, perceptions of safety and care did not conform to the same trend as other characteristics concerning scale. NP in urban parks was perceived as safer and more well-cared-for than real nature and NP in show gardens. This unexpected finding challenges the initial assumption that larger greenspaces are inherently perceived as less safe than smaller ones and less cared for. Participants' perception of safety and care may be influenced by factors beyond the scale of the greenspace, including the expectation of a larger real natural environment, a sense of security in society overall, and maintenance efforts.

Furthermore, these findings emphasize the importance of contextualizing greenspaces according to their designated purposes and functions. Nature reserves, urban parks, and show gardens serve distinct objectives and cater to diverse user needs: nature reserves primarily focus on conserving existing natural landscapes, urban parks provide leisure spaces for the public while considering ecological benefits, and show gardens often showcase visually impactful landscapes and design concepts. The variations in perceptions across different scales may be attributed to the specific intentions and expectations associated with each type of greenspace.

5.3.3. The key preferred characteristics of naturalistic planting (NP)

The findings from both questionnaires and interviews have revealed that various types of plantings possess distinguishable characteristics that significantly influence greenspace users' perceptions and preferences, especially within the urban context. Each of these planting characteristics plays a vital role and interacts with others to shape the views and preferences of greenspace users.

In this section, we will analyse and discuss the key characteristics across the entire research site, incorporating the responses from 1,600 questionnaires and 47 interviews. These characteristics encompass ecological and psychological benefits, perceptions of care and insecurity, considerations of structure and pattern, as well as the visual impact of various planting areas. By focusing on the key characteristics of naturalistic planting and contrasting them with natural vegetation and conventional planting, we aim to provide valuable insights for future landscape research and the development of naturalistic planting in urban environments.

i) Ecological and psychological benefits: Naturalness, restorativeness, wildlife support, perceived wildlife diversity, and environmental policy fitness

The study's findings illustrate that Chinese greenspace users acknowledge the 'ecological benefits' encompassing factors such as perceived naturalness, support for wildlife, perceived diversity of wildlife, and alignment with environmental policies. Additionally, the 'psychological benefits' including the perceived restorative effects i.e., self-reported peaceful and relaxed, derived from naturalistic plantings (NP), are well-regarded among these users. Naturalistic plantings are perceived as considerably more restorative and ecologically valuable in comparison to conventional plantings (CP). However, it is important to note that despite the higher appreciation of the naturalness and restorativeness of NP over CP, these characteristics are still perceived as falling short of the authenticity offered by real natural environments. However, despite not matching the authenticity of real nature, naturalistic plantings still exhibit positive associations with overall impression scores, attractiveness, and alignment with environmental policies. The perception of ecologically-oriented plantings and the perception of the attractiveness of NP in urban parks aligns with previous research (Hoyle, Hitchmough and Jorgensen, 2017a; Baharudin, 2020; Stanford *et al.*, 2022).

Moreover, if participants perceive NP as having lower costs on design and maintenance, their willingness to see such plantings in urban areas increases. This positive perception is often linked to the alignment of NP with governmental environmental policies. A study conducted in the UK, focusing on meadows, supports this notion by demonstrating that participants who become aware of the biodiversity and aesthetic advantages of such plantings, along with the potential cost savings, tend to exhibit more positive attitudes. These positive attitudes extend to increased tolerance and acceptance, even in cases where there might be a reduction in immediate visual impact (Southon *et al.*, 2017).

In addition to the quantitative findings, qualitative data from interviews highlight several factors that contribute to the perception of naturalness in plantings, including the level of human intervention, structural density, complexity, and vitality of vegetation, which is similar to the recognition of cognition, description, and perceptions of nature discussed in research question 1.

Our interviewees stressed that larger-scale urban landscapes offer a heightened sense of immersion, especially in woodland plantings characterized by dense undergrowth and a high canopy cover. Some interviewees even expressed a preference for 'hiding' within such dense urban woodlands throughout the day as a means of escaping the bustling urban routine. This aligns with findings from a study focused on tree preference, which highlights that a dense canopy serves as a signal of better prospects and refuge (Zhao, Xu and Li, 2017). This immersive encounter fosters a stronger connection to nature among individuals, delivering a sensation of relaxation and tranquillity amid the urban environment's hustle and bustle (Lamb and Purcell, 1990). It is worth

noting that, in some other research, dense vegetation has been associated with increased perceptions of unsafety (Jorgensen, Hitchmough and Calvert, 2002).

Overall, the study highlights the significant positive perception of naturalness, restorativeness and perceived ecological benefits of naturalistic landscapes. Despite not fully replicating the naturalness of real nature, these plantings receive favourable responses from greenspace users, supporting their acceptance as cost-effective and ecologically valuable options. The immersive experience provided by larger-scale landscapes further enhances the perceived restorative and natural qualities of these plantings. Understanding these perceptions is crucial for designing and implementing successful urban greenspaces that align with public preferences and contribute to improved urban environments.

ii) Care and insecurity: Messiness/disorder, care and safe

The study's comparison between naturalistic and conventional plantings in designed show gardens and urban parks reveals interesting variations in participants' perceptions of messiness. In the designed show garden, participants perceived naturalistic planting as messier compared to conventional planting, while in the urban park, the opposite was observed. Irrespective of the scale, participants consistently perceived naturalistic plantings to be notably more untidy than conventional plantings, yet less disorderly than the real natural environment. This pattern of perception is consistent with previous and widespread studies about naturalistic planting (Nassauer, 1995b; Dunnett and Hitchmough, 2004; Hitchmough, 2008; DelaFuente de Val, 2023).

Quantitative results across both sites indicate that the perception of messiness was associated with negative responses, such as feeling unsafe, concerns about visibility through vegetation, and a lower level of care. The higher density and complexity of the naturalistic planting contribute to its perceived messiness. Qualitative insights provide a more nuanced interpretation, highlighting that the concept of messiness is frequently associated with the idea of disorder. This term is employed as a neutral descriptor by interviewees for the structural and visual characteristics of vegetation, devoid of any positive or negative connotations. Notably, interviewees who recognized and accepted messiness as part of the naturalistic planting's charm tended to perceive it as more authentic and in line with their understanding of naturalness. This was in parallel with earlier research which indicated, that people considered naturalness as a 'messy ecosystem' (Nassauer, 1995b) and accepted messiness as an 'ecological aesthetic' in urban planting (Hoyle, Hitchmough and Jorgensen, 2017a).

The findings also reveal that the majority of participants felt secure and harboured no apprehensions regarding the presence of natural woodland vegetation in the urban setting. This sense of security primarily emanated from the presence of 'city parks with crowds' and 'security measures such as CCTV surveillance and park

patrols', as highlighted by the comments of our interviewees. While these methods can undoubtedly enhance feelings of safety, especially in crowded areas, they might concurrently diminish the perception of naturalness. This observation aligns with existing research indicating that individuals often seek solitude and respite from urban congestion in order to experience a greater sense of naturalness (Luque-Gil, Gómez-Moreno and Peláez-Fernández, 2018). Similarly, the implementation of 'security methods' conveys a notion of 'human care', a concept previously explored in earlier research (Nassauer, 1995b). Additionally, it also fosters a sense of 'order and control', a facet addressed in a PhD research study focused on Bradford's urban public open spaces (Ganji, 2018).

Understanding the nuanced perceptions of messiness and considering cultural associations can help inform Chinese landscape design that aligns with the preferences and values of greenspace users. Furthermore, recognizing the significance of human intervention and care in perceptions of messiness may offer insights into striking a balance between naturalistic aesthetics and human management in urban greenspaces.

iii) Structure and pattern: density and complexity

Our findings suggest that the general public tends to associate naturalness with dense and complex vegetation structures in real natural environments. However, the findings also suggest that this perception may not be as straightforward in the context of urban plantings. Urban naturalistic designs, despite their density and complexity, might not evoke the same level of naturalness as seen in real natural environments.

This discrepancy in perception may be attributed to various factors. Firstly, the unique context of urban nature, which differs from real nature, plays a role in shaping how naturalistic plantings are perceived. Additionally, the level of human intervention and management in terms of vegetation structure and pattern in urban greenspaces may also influence the perception of naturalness. Despite the dense and complex structure of naturalistic plantings mimicking what is found in real nature, the knowledge that these spaces are intentionally designed and managed by humans might influence how participants perceive their authenticity. Participants may recognize the deliberate efforts made to create these plantings, leading to the perception that they are designed rather than entirely natural. However, our questionnaire results also demonstrate a strong preference among greenspace users for dense and complex vegetation structures, enriched with a variety of plant species. This aligns with findings from prior research studies, further reinforcing the significance of this characteristic in influencing user preferences (Bjerke *et al.*, 2006; Qiu, Lindberg and Nielsen, 2013; Muratet *et al.*, 2015; Harris *et al.*, 2018).

Moreover, our findings also suggest that the structure and pattern of naturalistic plantings were considered beneficial for ecology and wildlife, as they serve as habitats and shelters, contributing to wildlife conservation.

Previous studies have suggested that diverse complex vegetation structures provide a useful vertical framework and habitat that supports the reproduction of various species (Hitchmough, 2008; Jim, 2011). Consequently, multiple complex planting structures may contribute to enhancing biodiversity in urban green spaces.

iv) Visual impact: Colourfulness, exquisiteness and seasonal interests

Our results underscore the noteworthy impact of colour on the perceptions and preferences of greenspace users. The questionnaire outcomes reveal a robust correlation between the perceived colourfulness in plantings and the overall impression score of vegetation. Insights from the interviews further validate that greenspace users tend to value a rich array of colours in planting designs, often anticipating the visual enhancement brought about by seasonal changes. These qualitative responses illustrate a diverse range of preferences, including bright and colourful flowers and leaves, various shades of green, as well as preferences for colour contrasts. Recent studies in other contexts have also shown that the public tends to favour a variety of bright and contrasting colours in vegetation (Kendal, Williams and Williams, 2012; Khew, Yokohari and Tanaka, 2014; Cameron and Hitchmough, 2016; Hoyle *et al.*, 2018; Nascimento, Marit Albers and Gegenfurtner, 2021).

In a previous Japanese study, a series of bright contrasting colours in vegetation appears to be universally favoured by the majority of the public (Todorova, Asakawa and Aikoh, 2004), with similar findings emerging in more recent UK research (Zhang, Dempsey and Cameron, 2023). Additionally, dramatic displays of flower colour can enhance people's aesthetic experience in the short term, while 'background' green planting is more likely to provide psychological restoration (Hoyle, Hitchmough and Jorgensen, 2017). In the Chinese context, the research emphasizes the simplicity and lightness of colour in natural planting, with a predominant green tone and occasional embellishments of red and yellow colours (Li *et al.*, 2019; Guo, 2022). It is worth noting that red and yellow not only represent auspiciousness and good luck in Chinese culture but also the colours of the Chinese flag, suggesting that Chinese greenspace users' preferred planting may need to reflect a certain degree of national identity. Currently, a dearth of literature exists that substantiates the connection between the choice of red and yellow colours in Chinese landscapes and their symbolism in relation to national identity.

The questionnaire data show that green spaces with a medium coverage of coloured 'green' space (about 5% to 20%) exhibit greater naturalness, attractiveness, and restorativeness, whether it is naturalistic or conventional planting. On the other hand, coloured 'green' spaces with very high coverage (about 50% to 80%) are perceived as more exquisite, complex, and well-cared for, but less natural and less supportive of wildlife habitats. This finding differs slightly from similar landscape surveys in the UK which suggested that flower cover

beyond a critical threshold (27%) was considered significantly more attractive than that with a lower percentage of flower cover (Hoyle, Hitchmough and Jorgensen, 2017a). The discrepancy may be attributed to cultural differences, as some interviewees pointed out that excessive colour could create a sense of disorder and decrease attractiveness. For example, in the Beijing Garden at EXPO, with the highest coverage of coloured 'green' space, many individuals expressed their disfavour toward excessive use of colour in planting design. Additionally, the limited number of survey sites in this study compared to Hoyle's 31 research sites may have affected the representativeness concerning the colour threshold, which could be addressed in future research.

Furthermore, the findings from the questionnaire reveal that in show gardens, the exquisiteness of naturalistic plantings does not significantly contribute to the perception of naturalness. Instead, factors like colourfulness and attractiveness play a more influential role. In city parks, the level of familiarity with the plantings affects their perceived exquisiteness. This suggests that in small-scale show garden settings, the overall aesthetic appeal and visual stimulation play a more prominent role in shaping the perception of naturalness, while in larger-scale park settings, where people are more familiar with the naturalistic designs and immerse themselves in the surroundings, they may develop a deeper appreciation for the intricate and delicate details of the plantings, leading to a perception of greater exquisiteness, as implicitly supported by a study on virtual reality (Reese, Stahlberg and Menzel, 2022).

5.3.4. Summary for Research Question 3

Building upon the foundation of comprehending the recognition, description, and perception of both 'nature' in the first question and 'urban nature' in the second question, this research question is poised to delve into the essence of public perceptions and preferences regarding designed naturalistic plantings within urban environments.

In summary, the findings highlight the significant role that naturalistic plantings can play in urban parks and show gardens. While naturalistic plantings cannot fully replicate the complexity and richness of real natural environments, naturalistic plantings provide a nature-like environment in urban areas and help mitigate the sense of insecurity or other negative perceptions of real nature. Participants highly appreciated the restorative qualities of these plantings, finding them visually attractive and evoking a sense of naturalness that enhances the overall urban experience.

Moreover, the ecological benefits of naturalistic plantings were widely recognized, with participants acknowledging their potential to support wildlife and create vital habitats. This alignment with governmental environmental policies further emphasized the value of incorporating such ecological landscapes in urban design. The results underscore the positive preference and appreciation for naturalistic plantings due to their

ability to create a nature-inspired ambience while contributing to urban biodiversity and sustainable development.

In advocating for ecological landscapes in urban areas, these plantings' characteristics - ecological and psychological benefits, care and insecurity, structure and pattern, and visual impact - hold particular significance. They provide valuable insights for landscape design and urban planning, urging a greater emphasis on nature-oriented elements to create harmonious and sustainable urban environments. By integrating naturalistic plantings, urban planners can offer residents and visitors the opportunity to connect with nature, fostering a healthier and more fulfilling urban lifestyle.

5.4. Research Question 4:

Are greenspace users' beliefs, values and socio-demographic factors drivers of responses to nature, urban nature and naturalistic plantings?

Our research stands as a pioneering study that not only delves into the perceptions and preferences of naturalistic plantings, contrasting them with real nature and Chinese conventional planting, but also provides a comprehensive exploration of greenspace users' beliefs, values, and socio-demographic factors in the Chinese context. This inquiry markedly advances our comprehension of how socio-demographic variables wield influence on the recognition, definition, and perception of 'nature', 'urban nature' and naturalistic planting. Through analysing participants' responses, the research provides insights into how individuals with different beliefs, values, and socio-demographic backgrounds, including gender, age, education, profession, childhood and current living place, income, employment, and religion, perceive and interpret the natural environment. These findings enhance our overall comprehension of the role that beliefs, values, and socio-demographic factors play in shaping human-nature relationships and serve as a basis for further investigations into the perception and preference of naturalistic planting.

5.4.1. The role of beliefs and values related to the urban environment

A survey involving 600 participants at Lotus Lake Park urban park addressed beliefs and values about the urban environment. Through Principal Component Analysis (PCA), two key components emerged: 'environmental sustainability' (encompassing climate change, environmental protection, and belief about establishing real

nature in the city) and 'biodiversity conservation' (covering urban wildlife value, wildlife habitats, and urban woodlands' carbon emission reduction beliefs) (for detailed factors, refer to Table 4.34).

Notably, our study revealed a positive correlation solely between beliefs and values concerning biodiversity conservation and the overall impression score attributed to vegetation in naturalistic urban park plantings. This suggests that participants who prioritize and hold in high regard biodiversity conservation are inclined to possess a favourable perception of naturalistic plantings within urban landscapes.

On the other hand, beliefs and values concerning environmental sustainability showed a different pattern. These beliefs and values were associated with education and income, suggesting that individuals with higher levels of education and income tended to express greater concern for environmental sustainability. Although previous research has also shown associations with age and gender (VandenBorn *et al.*, 2001; Capaldi A., Dopko L. and Zelenski, 2014), as well as professional background (Zheng, Zhang and Chen, 2011), our study did not observe these correlations. However, unlike biodiversity conservation, there was no direct correlation between beliefs and values in environmental sustainability and the overall impression score of naturalistic plantings.

Moreover, the study found that participants who had childhood experiences in nature displayed a more positive attitude toward both environmental sustainability and biodiversity conservation. This suggests that early exposure to nature may influence individuals' values and beliefs, fostering a deeper appreciation for the importance of conserving biodiversity and maintaining environmental sustainability. This finding parallels with a study involving 2,004 participants in the United States, which demonstrated that adult environmental attitudes are positively influenced by childhood experiences with nature, encompassing both 'wild' activities like hiking and camping, as well as 'domesticated' interactions such as picking flowers, planting, and tending to potted plants (Wells and Lekies, 2006).

Understanding the connections between participants' beliefs, values, and perceptions of naturalistic plantings can provide valuable insights for targeted environmental education and communication strategies to promote the adoption of naturalistic planting in urban contexts.

5.4.2. The role of gender

This study provides insights into gender differences in the perception of nature. Female participants showed a higher level of concern regarding 'unknown dangers and illegibility' in BM natural environments (n=200), which is consistent with previous research findings (Jorgensen, Hitchmough and Calvert, 2002). This suggests that women may perceive wild nature as potentially risky or unclear, leading to a more cautious and vigilant approach in such settings. Their preference for the terraced landscape, which represents nature on a larger

scale, further supports their inclination towards natural spaces with higher levels of human intervention. This predilection finds an explanation in evolutionary theory, where distinct genders assume varying evolutionary roles and developmental experiences. Women traditionally fulfilled roles as gatherers of sustenance, hence gravitating towards landscapes offering potential productivity, e.g., terraced agricultural landscapes. Conversely, men, who historically engaged in hunting, exhibit a proclivity for diverse topography and landscapes abundant in wildlife (Strumse, 1996; Wood *et al.*, 2002; Wang and Zhao, 2017).

Interestingly, our study yielded an unexpected result: there existed no noteworthy distinction between female and male participants in their perception of insecurity—reflected through feelings of unease and unclear surroundings—within naturalistic planting environments, be it in urban parks or show gardens (n=800). This finding suggests that the urban context may play a role in mitigating fear to some degree. However, it is also possible that the presence of designed naturalistic plantings, which show evidence of human care and management (Nassauer, 1995b), may also contribute to the perception of safety in these urban greenspaces.

Additionally, our questionnaire finding also indicates that female participants consistently reported a significantly greater sense of naturalness across all vegetation communities, irrespective of scale and planting types (n=1600). This finding aligns with an earlier UK-based study which suggested that women tend to perceive higher levels of naturalness compared to men within woodland, shrub, and herbaceous plantings across urban greenspaces in England (Hoyle, Jorgensen and Hitchmough, 2019). This trend can be attributed to existing research indicating that women may possess enhanced perception and memory of vegetation complexity (Silverman and Eals, 1996), along with stronger pro-environmental beliefs and values relative to men (Xiao and Mccright, 2015).

Furthermore, traditional Chinese culture appeared to have a stronger influence on women's interests in nature compared to men (n=1600). This finding highlights the role of Chinese culture in shaping women's perspectives and interactions with the natural world, although further research is needed to support this observation. A potential explanation for this phenomenon could be that the greater appreciation of Chinese traditional gardens among female participants might be positively linked to their interest in nature. A study has pointed out that women tend to assign higher beauty ratings to all types of gardens compared to men in the Netherlands (VandenBerg and Winsum-westra, 2010).

Moreover, women in this study placed a greater emphasis on engaging in activities such as wandering, running, or taking photos in nature (n=1600). This can be explained by previous research suggesting that women find more fulfilment in physical activities in natural environments as opposed to other contexts like urban streets or indoor fitness facilities (Krenichyn, 2006). Similarly, another study has proposed that women experience more mental restoration from walking through various types of plantings compared to men in the UK (Hoyle, 2015).

Despite their concerns about the natural environment, women may seek deeper connections through active interactions with nature. Similarly, a study conducted in England indicated that infrequent users of natural environments were more likely to be female, although females were still less likely to report being 'not interested' in nature visits (Boyd *et al.*, 2018).

5.4.3. The role of age

This study delves into the correlation between age and perceptions of nature, as well as the determinants that shape individuals' inclinations toward nature. With the exception of natural mountain scenes, which were frequently favoured, the findings highlight those participants in late adulthood, aged over 60, were more inclined to associate naturalness with features characterized by substantial human intervention, such as terraced landscapes, conventionally manicured gardens, and potted domestic plants (n=1600). This suggests that people's notions of what constitutes nature might evolve to encompass a higher degree of human involvement as they age. This evolution could potentially be influenced by the fact that older participants, in their later adulthood, have fewer experiences with nature and an increased reliance on human care in their surroundings.

An important point to note is that participants in late adulthood experienced their childhood around the 1960s. During that period, China underwent significant negative impacts on its urban landscape development due to political factors and famine-related disasters. He and Zhao (2022) highlights in their historical research that the years from 1958 to 1965 were considered a deceleration phase in the development of Chinese landscape architecture, as urban garden projects experienced stagnation or even transformation into agricultural land. He and Zhao also points out that It was not until the early 1970s that urban green spaces, park construction, and tree planting initiatives were revitalized to improve the city's image. Lotus Lake Park (one of our research sites) was established during this era, with minimal greening efforts. Subsequently, under the influence of Western landscape design, Chinese green space design moved beyond basic mown lawns with simple layers, embracing ornamental patterned planting with flowers as a predominant landscape aesthetic. This is noteworthy because the mainstream aesthetic preferences in our respondents' childhood experienced landscapes could bear relevance to their future landscape perceptions and preferences, although Chinese research has also indicated that landscape preferences can change over time (Mao, Wang and Wu, 2021), which parallels early Western situations (Özgüner and Kendle, 2006).

Similar to the representation of nature, disparities emerged with age in the factors underpinning individuals' interest in nature, whether rooted in Chinese culture or personal experiences (n=1600). Older participants tended to attribute their interest to Chinese cultural elements, including Chinese calligraphy, literature, poetry, landscape painting, traditional Chinese gardens, and philosophical traditions, as initially explored in Section

5.1.4 concerning the role of Chinese culture. This finding echoes the literature about attitudes toward Chinese calligraphic landscapes that young people like and understand calligraphy less than older generations and that their interest in it is diminishing (Zhou, Zhang and Edelheim, 2013). In contrast, younger participants emphasized the significance of personal experience in shaping their interests, as nature provides the dual benefits of providing privacy and space for socialization, allowing individuals to explore new identities and behaviours (Jorgensen and Keenan, 2012).

Moreover, concerning the participants' reactions to vegetation in real natural settings (n=200) and naturalistic planting in urban parks (n=600), it was observed that participants in young adulthood between 18 and 39 years old displayed a tendency to view vegetation as more complex and disordered. This variance might be attributed to the fact that younger participants often possess higher levels of education, leading to heightened recognition of the complexities inherent in vegetation patterns and structures.

In contrast, respondents in late adulthood perceived real natural vegetation as more perilous. This group voiced heightened concerns regarding unknown hazards and illegibility in natural environments, relative to individuals in middle adulthood (40 to 59 years). These contrasting perceptions may contribute to the higher overall impression scores given by middle-aged participants and lower scores given by younger individuals when evaluating real natural vegetation. These findings contradict previous research that suggests younger respondents generally have a higher preference for wild nature (VandenBerg and Koole, 2006). Regarding the context of designed naturalistic plantings in urban settings, similar to the observations among female participants, individuals in late adulthood did not exhibit distinct differences in the perception of insecurity compared to other age groups. Conversely, late adulthood participants tended to assign higher scores to naturalistic plantings compared to young adulthood participants.

The contrasting results may be influenced by various factors. One possible explanation is that the higher preference for wild nature among younger respondents encompasses a comprehensive evaluation that extends beyond the assessment of vegetation's overall impression. Additionally, the lower overall impression scores given to natural vegetation may be attributed to various factors, including the illegibility of natural vegetation in the context of nature, as mentioned in the interviews. It is worth noting that this aspect was not captured by the questionnaire results.

5.4.4. The role of education

Our findings reveal that individuals with lower educational qualifications (high school or below) are more likely to associate nature with a higher degree of human intervention via features like terraced landscapes, conventional well-pruned gardens, and domestic plants in pots, in parallel with the finding about age. Previous

studies have indicated a positive association between higher education levels and more natural aesthetic appreciation (VandenBerg and Winsum-westra, 2010). It is noteworthy to highlight that education exhibits a negative correlation with age in our study, which aligns with the real-world trend where younger individuals tend to hold higher average educational qualifications.

Furthermore, among the participants, those with higher educational qualifications exhibited a tendency to perceive increased complexity and disorder in both real natural environments (n=200) and naturalistic vegetation communities within urban parks (n=600), when compared to individuals with lower educational qualifications. This finding contradicts previous research that suggests individuals with higher education levels with doctorate degrees may perceive lower levels of diversity and complexity (Hoyle, 2021). The contrasting results may be attributed to differences in study contexts, as the previous research focused on a designed garden setting.

In addition, among the individuals surveyed within the nature reserve (n=200), those possessing higher educational qualifications exhibited lower levels of perceived danger and boredom in the vegetation of genuine natural environments. Furthermore, they expressed reduced concerns regarding unkempt dense vegetation in natural settings. This may be due to environmental education that high-educated participants may have to mitigate these negative perceptions of nature and wild vegetation (DelaFuente de Val, 2023).

Participants with lower educational qualifications tend to emphasize physical activities in nature as important reasons for engaging with nature. Meanwhile, those with lower educational qualifications tend to appreciate the impact of Chinese culture on their interests in nature.

5.4.5. The role of profession

Greenspace users with diverse disciplines and occupations displayed distinct sensitivities to human intervention in their conceptualizations of nature. Additionally, their motivations for visiting natural environments varied. Our questionnaire results suggest that individuals from biological and natural environment-related fields exhibited heightened sensitivity to intricate vegetation structures. When envisioning their ideal representations of nature, they showed a preference for planting schemes with minimal human intervention, regardless of the scale. This aligns with earlier research that suggests frequent engagement with greenspaces nurtures an appreciation for real nature's nuanced intricacies in contrast to the more structured patterns found in human-designed environments (Rhode and Kendle, 1997).

Similarly, creative practitioners and design professionals also show a preference for less human intervention in urban parks and show garden settings. These findings are consistent with previous research that highlights the influence of professional backgrounds, such as specialized education in ecology or conservation, and increased

exposure to natural areas abroad, which can lead to a preference for naturalistic landscapes (Özgüner, Kendle and Bisgrove, 2007; Khew, Yokohari and Tanaka, 2014; Fischer *et al.*, 2018; Hoyle, 2021). This explains why both individuals in biological and natural-environment-related disciplines, as well as creative practitioners and design professionals, prefer landscapes with minimal human intervention to represent their ideal nature.

Moreover, individuals employed in biological and natural environment-related domains tend to place greater emphasis on passive, sedentary pursuits, such as utilizing the natural environment as a backdrop for leisure activities, as well as active observation and necessary contact with nature. In contrast, they exhibit less interest in physical activities like exercise or photography, particularly when compared to other occupational cohorts. This inclination could stem from the particular demands of their professional roles, necessitating concentrated observation and study of the natural environment.

In addition to its impact on landscape perception and preferences, professional expertise plays a vital role in landscape design, construction, and subsequent maintenance. Professionals' insights are irreplaceable throughout these stages. Two stakeholders interviewees from the Beijing Municipal Bureau of Parks and Forestry, noted that there is currently a lack of awareness and detailed knowledge among landscape designers and related professionals regarding naturalistic planting. They mentioned that the imitation of Western designs without localization hinders the acceptance of these designs by the Chinese public. However, both interviewees believed that as environmental education continues to advance and public receptiveness grows, coupled with ongoing learning by design and construction stakeholders, naturalistic planting will gain broader acceptance in China. This acceptance will not only align with aesthetic preferences but also yield evident sustainable ecological benefits, contributing to its widespread adoption in the future.

5.4.6. The role of childhood experience and living place

Participants' childhood experiences and their current residential locations have emerged as noteworthy factors in shaping their recognition, definition, and perception of nature. The results from our questionnaire underscore that individuals who spent their childhood in proximity to urban fringes tended to express fewer apprehensions about unknown dangers and artificial cues within natural settings. This observation implies that childhood proximity to natural environments could influence perceptions of safety and familiarity. This finding aligns with earlier research exploring the impact of childhood nature experiences (Sebba, 1991; Thompson, Aspinall and Montarzino, 2008; Cleary *et al.*, 2020).

Moreover, our questionnaire results revealed that individuals with more childhood experiences in natural settings tended to perceive higher levels of attractiveness and restorative qualities in natural vegetation. This outcome underscores the positive influence of early exposure to wilderness on individuals' perceptions and

environmental attitudes. This finding is in line with earlier research that explored the influence of childhood nature experiences on shaping adult environmental consciousness (Wells and Lekies, 2006).

In terms of their current residential locations, participants living in first-tier cities demonstrated the least concerns regarding unkempt dense vegetation in real nature. Additionally, these participants perceived notably less attractiveness and restorative qualities in Chinese conventional plantings within urban parks. Moreover, they placed a heightened emphasis on personal experiences as the motivating factor behind their interest in nature. This inclination could be attributed to the possibility that urban residents in major first-tier cities might have access to better environmental education and economic resources, facilitating their engagement with the natural environment. Conversely, individuals dwelling in towns or villages perceived their interest in nature to be less influenced by personal experiences. These divergences can be attributed to variances in exposure to diverse natural environments, as mentioned in prior research (Luque-Gil, Gómez-Moreno and Peláez-Fernández, 2018; Lenaerts *et al.*, 2021) and the influence of environmental education provided more readily in first-tier cities on individuals' connections with nature (VandenBorn *et al.*, 2001).

5.4.7. The role of income and employment status

The findings of our study highlight the influence of income and employment status on individuals' perceptions of nature. Participants with low and middle incomes, as well as unemployed individuals, demonstrated a higher acceptance of highly intervened terraced landscapes. In contrast, participants with low incomes showed a preference for middle-scale conventional well-pruned gardens, while those with middle incomes and retired individuals favoured middle-scale natural meadow paths.

Meanwhile, participants with lower incomes expressed more concerns about unkempt dense vegetation in nature compared to those with higher incomes and students. This suggests that income level may shape individuals' perception of naturalness and their recognition of human intervention in natural landscapes. The higher exposure to diverse planting styles in private garden contexts among individuals with higher incomes may contribute to their acceptance of a wider range of natural landscapes, and vegetation. This phenomenon can be attributed to the 'luxury effect' (Hope *et al.*, 2003). Significantly, our questionnaire results also reveal a positive correlation between educational attainment and income within the sample of 1600 participants. This finding lends support to the congruence observed in the outcomes related to educational qualifications as discussed earlier.

Furthermore, retired participants placed greater importance on 'nature as a leisure setting' and physical activities in nature. This observation suggests that leisure and recreational dimensions carry greater weight for

this demographic. Previous research has suggested that utilizing nature as a backdrop can contribute to the establishment and sustenance of social relationships (Allard-Poesi and Massu, 2023).

Interestingly, students displayed distinct patterns in their perceptions compared to other participant groups. They showed less acceptance of small-scale domestic plants in pots and considered neither traditional culture nor personal experience to have significant impacts on their interests in nature. This finding suggests that students' perspectives and priorities regarding nature may be influenced by factors such as their educational background and family background. It is possible that their academic experiences shape their unique views on and interests in nature (Zheng, Zhang and Chen, 2011).

5.4.8. The role of religion

Religion's influence on the recognition, definition, and perception of nature was found to be limited in this study, based on questionnaire data. Specifically, in the context of the three traditional religions or philosophies in China, Daoists and Buddhists tended to attribute greater significance to traditional Chinese culture in shaping their interests in nature compared to non-religious participants. However, Confucianism showed a different pattern, with Confucianists perceiving less influence of Chinese culture on their interest in nature. The distinction observed in this study suggests that different religious philosophies may share similar interpretations of the pursuit of nature and discussions as a whole regarding the impact of Chinese philosophical thoughts on nature (Bretelle-Establet, 2016). However, this study also indicates that the deeper motivations driving the interests in the nature of Chinese religious participants may differ, highlighting the need for further research to provide additional support. Additionally, it is important to interpret these results with caution, as participants identifying as 'religious' represented only 10.7% of the total sample size of 1600 participants. Therefore, the impact of religion on the recognition, definition, and perception of nature may be underestimated due to the limited representation of religious individuals in the study.

5.4.9. Summary for Research Question 4

In the investigation of public perceptions, descriptions, and interpretations of real nature, urban nature and naturalistic planting, a significant finding emerged: the beliefs, values, and socio-demographic characteristics of greenspace users played a pivotal role. Therefore, this research question delves into how these users' beliefs and values impact their responses, in conjunction with their socio-demographic attributes, encompassing gender, age, education, profession, childhood, current living place, income, employment, and religious affiliation.

To summarize, greenspace users demonstrate heightened beliefs and values concerning biodiversity conservation, displaying a preference for naturalistic urban park plantings.

Female participants and those in late adulthood express more concerns regarding unknown dangers and illegibility in authentic natural environments. However, they do not exhibit distinctive differences from others in their perception of insecurity towards naturalistic plantings in urban parks, as they tend to perceive care from such plantings.

Participants in young adulthood and individuals with higher education levels also share a similarity in perceiving greater complexity and disorder in vegetation in real nature and urban park naturalistic planting. This trend aligns with real-world situations, where the younger generation tends to possess higher average education levels.

In terms of occupation, practitioners in biological and natural environment-related fields are generally more sensitive to the complexity of vegetation structure and pattern. Creative practitioners and design experts also tend to prefer naturalistic planting due to its reduced human intervention and traces.

Childhood nature experiences contribute to perceiving higher levels of attractiveness and restorative qualities in natural vegetation. Moreover, individuals residing in first-tier cities express a stronger preference for naturalistic planting compared to conventional planting in urban parks.

Income levels can indeed influence individuals' perception of naturalness and their acknowledgement of human intervention within natural landscapes. Moreover, retired participants emphasize the significance of leisure and recreational greenspaces. While religion has limited associations with perception and preference.

Our study on the beliefs, values, and socio-demographic factors of greenspace users in the context of Chinese landscapes goes beyond theoretical investigation, providing valuable insights that can inform practical decisions in areas such as establishing naturalistic plantings and planning for future sustainable urban development. By recognizing and accommodating the diverse perceptions of and preferences of various user groups, the implementation of naturalistic planting can contribute to establishing natural environments that are widely-embraced, sustainable, and enriching for all Chinese individuals.

| Chapter 6 : Conclusions and Implications for Policy, Practice and Further Research

In this concluding chapter, we encapsulate the culmination of our investigation into the public perception and preference in relation to designed naturalistic planting in an urban context. This chapter commences by reviewing the primary findings of our research and discussing potential limitations inherent in our study. Additionally, we outline the contributions in both theoretical and real-world applications and put forth recommendations for future research in the field of landscape studies.

6.1. Research Overview and conclusions

Amidst rapid urbanization, a range of urban environmental and well-being concerns have emerged, highlighting the need for ecologically beneficial and aesthetically pleasing urban environments. Naturalistic plantings have been introduced in major Chinese cities such as Beijing as it is recognised for ecological benefits. However, there is a lack of clear understanding of the perception of and preference for naturalistic planting design amongst the Chinese public.

This research endeavours to investigate evolving perceptions and preferences for designed naturalistic urban plantings in Beijing, for informing future urban greenspace design and management. The research methodology progresses through a systematic approach, starting from the investigation that encompasses recognition, definition, and perception in the broader context of ‘nature’, narrowing down to ‘urban greenspaces’, and ultimately delving into naturalistic planting. During the exploration of the perception of naturalistic planting in urban areas, the study not only compares it with real natural environments but also contrasts it with conventional planting practices prevalent in China. The research involves a total of 1,600 participants across national nature reserves, urban parks, and EXPO show gardens in Beijing. On-site questionnaires were administered, followed by semi-structured, in-depth interviews conducted with a subset of 47 interviewees. These interviews were carried out both online and on-site.

Research Question 1: How do Chinese greenspace users recognise, define and perceive 'nature'?

This study revealed that in the case of Beijing, natural settings with greatness and forces such as spectacular mountains, forests, rivers, and coasts are preferred as leisure settings and activity spaces. For our participants, 'nature' was defined and recognised in terms of minimal human intervention and equated with large-scale/expansive views. Complex vegetation and dynamic ecological processes further contribute to this recognition. While most greenspace users perceive that such nature can be imitated and designed by humans, they also acknowledge that authentically replicating real nature remains challenging. Concerns about nature encompassed issues like 'unknown dangers and illegibility' as well as 'litter and crowds', emphasizing the significance of human trace, environmental quality, and personal space. Most users prefer gentle engagement at nature's edges, avoiding destruction through light engagement like walking, playing, observing, and photography. Furthermore, the perspectives of older generations are distinctly shaped by traditional Chinese cultural influences, evident in their acceptance of the messiness and disorder of planting. Conversely, the viewpoints of the younger generation are moulded by their personal experiences related to nature. The impact of Shanshui culture is comprehensive and often subconsciously ingrained among participants.

Research Question 2: How do Chinese greenspace users recognise and evaluate 'urban greenspace'?

Building on Chinese greenspace users' insights into 'nature', this research delved into having nature in urban areas. We explored 'urban' concepts, the interplay between urban and nature, attitudes toward urban nature's pros and cons, and beliefs about urban environments. Our interviews revealed three city-related themes: civilization and human care, population density, and place identity. While integrating nature into urban spaces receives endorsement, attitudes vary based on objective and subjective viewpoints, reflecting a paradoxical stance known as 'Not in My Backyard'. This phenomenon involves individuals supporting projects in theory but opposing their implementation in their immediate surroundings. Urban nature's benefits span well-being and ecology, with challenges including costs, public acceptance, identity, and wildlife. Environmental protection prevailed over economic growth. Exposure to naturalistic settings reinforces belief in replicating nature, fostering sustainable urban nature and 'high impact, low input' greenspaces for better urban living.

Research Question 3: How do greenspace users perceive naturalistic planting in urban areas?

Building on the grasp of 'nature' and 'urban nature', this study explores public perceptions and preferences for designed naturalistic plantings specifically in the urban context. In essence, our findings highlighted these designed naturalistic plantings' significance in urban parks and show gardens. These designs emulate the intricate structures, density, and species richness found in nature, offering diversity, wildlife habitat, and visual

appeal through changing seasons. Participants highly valued the natural and restorative aspects of these designs, enhancing urban well-being in an urban context. The attributes of these naturalistic plantings presented a sustainable and alternative approach to conventional planting for landscape design and urban planning, fostering a healthier urban lifestyle through a stronger connection with nature.

Research Question 4: Are greenspace users' beliefs and values and socio-demographic factors drivers of these responses?

This enquiry sought to understand the role of beliefs, values, and socio-demographic factors as drivers of response in a Chinese context, considering gender, age, education, profession, childhood, living place, income, employment, and religion. We found that our participants prioritised biodiversity conservation, favouring naturalistic urban park plantings. Concerns varied among groups, yet participants in young adulthood and who were more highly educated were more likely to perceive vegetation complexity. Occupation and childhood nature experiences also acted as drivers of perceptions and preferences. Additionally, first-tier city residents showed a preference for urban park naturalistic planting. Income and employment, which correlate with age and education, played a significant role in shaping perceptions of naturalness to a certain degree, while religion had a minimal effect. These insights guided practical decisions in naturalistic planting and sustainable urban planning, ensuring diverse preferences shape embraced, sustainable environments for all in China.

Key findings from our research:

- 'Human intervention', 'scale', and 'vegetation structure and appearance' are prominent drivers in how individuals perceive nature, as well as the 'diversity and ecological processes' and 'sensation and resemblance to previous nature experience'.
- Chinese greenspace users effectively distinguish between naturalistic and conventional planting in urban parks, showing a pronounced preference for the former. This preference is linked to the perceived qualities of naturalistic planting, such as restorativeness and wildlife-friendliness, which enhance the appeal of urban parks.
- In show gardens, naturalistic planting is less favoured compared to well-maintained conventional planting, likely due to its reduced visual impact. Furthermore, a high proportion of non-green space (50%-80%) in these gardens is associated with increased attractiveness but a decrease in perceived ecological value and alignment with environmental policies.
- In natural environments, denser and more complex vegetation is associated with a higher perception of naturalness. However, this correlation is not as strong in urban parks and show gardens.

- Public perception and preference for naturalistic planting are significantly influenced by users' beliefs, values, and socio-demographic factors, particularly age and educational level. Those with heightened concerns about biodiversity conservation tend to have a favourable perception of naturalistic plantings in urban landscapes. The younger generation, especially those with higher education levels, are more inclined to appreciate the complexity of vegetation.

6.2. Limitations

In the pursuit of comprehending environmental perception intricacies, this study confronts several noteworthy limitations. These constraints encapsulate the experiential approach, variable definitions, sampling biases, and cross-national translation challenges. While each limitation bears relevance, they collectively frame the boundaries within which this research operates, influencing its scope and findings. This section expounds upon these limitations, providing a comprehensive understanding of their impact on the study's outcomes and conclusions.

Site maintenance and weather dynamics

While the experiential approach of guiding participants through physical exploration of planting areas on site has unquestionably yielded valuable and authentic insights, it is important to acknowledge the presence of challenges within this method. We selected five representative research sites, each of which holds the potential to present diverse scenes on a daily basis due to the interplay of maintenance activities and variable weather conditions. For instance, during the survey period at the EXPO garden, the annual plants were entirely replaced to enhance visual impact; similarly, during a specific short timeframe in autumn at Baihua Mountain, the foliage underwent a gradual transformation in colour, potentially resulting in variations in colour perception. Moreover, the constant fluctuations in weather conditions, encompassing elements such as temperature, humidity, wind, and light, have introduced a layer of unpredictability that could significantly influence participants' responses and subsequently mould their perceptions. In light of this, it becomes imperative to approach the interpretation of results derived through this methodology with thoughtful consideration and a keen awareness of these complexities.

Subjective definition of variables

The process of ascribing variable descriptors to delineate wildlife biodiversity and the percentage of 'green' space with colour could potentially be subject to its dependence on the observation and expertise of the researcher and supervisor. Moreover, certain classifications, such as age groups (young/middle/late adulthood) and income levels (low/middle/high, and so forth), merit careful consideration. In real-world scenarios, the demarcation between each value within these variables may not be definitively distinct, warranting attention.

While the identification of statistically significant outcomes and discernible patterns in their influence lends credence to intentional categorizations, it remains pivotal to recognise the inherent susceptibility to subjectivity within this allocation process.

Sampling bias towards space users

Although our research aspired to encompass a wide range of the public, the reality unfolded in a manner where respondents for both questionnaires and interviews were exclusively drawn from a specific user demographic. For instance, at the prominent research site, EXPO Garden, the natural inclination was to attract individuals with a vested interest in horticulture and landscape design. Likewise, the remote location of Baihua Mountain Nature Reserve from Beijing's city centre, along with its higher altitude and complex topography, naturally tends to deter vulnerable visitors with limited mobility. This particular limitation constrains a comprehensive comprehension of how various segments of general greenspace users might perceive the nuances of nature, urban greenery, and naturalistic planting within these spaces. Embracing their perspectives could have illuminated potential rationales underlying their perceptions and preferences.

Limited representation of value systems

Conducted primarily among individuals deeply vested in the environment, horticulture, or landscapes, the interviews inadvertently introduced a bias toward those aligned with biospheric (nature-centred) value systems. However, a more holistic perspective could have been attained by assimilating interviews with individuals predominantly oriented towards social altruistic (human-centred) or egoistic (self-centred) values.

Translation considerations

Given the cross-national nature of our research, involving translations between English and Chinese, the process of translation becomes susceptible to potential subjectivity, being undertaken by the researcher. Certain translated terms encompass diverse interpretations and meanings, emphasizing the necessity of recognizing and addressing these nuances in the cross-lingual renditions.

6.3. Contribution to knowledge

As global urbanization and environmental awareness gather momentum, our research not only investigates Chinese preferences for naturalistic planting over conventional planting in specific urban contexts, highlighting the importance of perceived naturalness and restorativeness, consistent with studies in other countries. It also delves deeply into preferred planting characteristics and addresses concerns encompassing aspects like messiness, care, and wildlife, furnishing a thorough explanation.

Furthermore, the study has meticulously categorized three distinct vegetation types (real nature, naturalistic planting, and conventional planting) and their various scales (large national nature reserves, urban parks, and small-scale show gardens), offering a comprehensive framework for future landscape studies in China. Moreover, the study delves into an extensive spectrum of beliefs, values, and comprehensive demographic factors, thereby compensating for the previously limited exploration of intricate demographic investigations in China.

In terms of methodological contributions, the study underscores the advantages of employing a mixed-methods approach, specifically starting with quantitative research followed by qualitative analysis. The quantitative data analysis has illuminated statistical patterns and correlations, while qualitative data has delved deeper into the interpretation of these patterns in the context of human perceptions and experiences. This research design offers valuable insights for shaping future methodologies in landscape perception and preference studies. Additionally, the international background of this study necessitated significant translation efforts. The Chinese version of the Nature Relatedness Scale employed in this study has demonstrated its accuracy and feasibility, potentially serving as a reliable tool for subsequent environmental research. Moreover, the study acknowledges the potential ambiguities arising from the translation of certain terms between Chinese and English, such as ‘wildlife’ and ‘messiness’. This awareness can foster effective communication across linguistic and cultural barriers.

In conclusion, this study provides a foundation for understanding perceptions and preferences related to naturalistic planting in a global context. Its comprehensive vegetation categorization, methodological insights, and cross-linguistic considerations contribute to the advancement of landscape perception research.

6.4. Practical implication

This study’s insights have practical applications beyond academia, including contributions to global and Chinese ecological civilization development, urban greenspace planning, design, management, nature reserve management, and environmental education.

Contributions to global and Chinese ecological civilization development

Amidst the surge in urbanization and escalating global climate concerns, China’s commitment to sustainable urban development assumes a pivotal role. The insights derived from this research offer a distinct opportunity to harmonize climate adaptation and biodiversity preservation through an innovative approach—naturalistic planting designs—within Chinese urban contexts. By implementing these strategies, urban greenspaces can evolve into multifunctional centres, simultaneously bolstering climate resilience, fostering biodiversity, and enhancing the quality of life for Chinese urban residents. The integration of these research findings, which

emphasize the positive impact of naturalistic planting on perceptions and preferences, can drive the adoption of nature-based solutions in urban planning and design. This potential win-win scenario holds profound relevance for China, which seeks to reconcile rapid urban expansion with environmental preservation. This vision seamlessly aligns with China's broader goals of ecological civilization development, further solidifying the nation's pioneering role in forging holistic urban environments that champion both environmental sustainability and human well-being.

Policy-making and planning, design and management and maintenance in urban greenspace

Policy-making, urban planning, design, and management of urban greenspaces require an understanding of people's perceptions and preferences. This insight guides decisions from planning to maintenance. During the early phases, emphasizing naturalness by reducing human intervention and expanding the greenspace scale can be important. Combining Chinese conventional and naturalistic styles in planting can create diverse landscapes. Incorporating topographic variations and water features enhances sensory experiences. Introducing aromatic plant species can enhance users' connection to nature. Maintenance should align with evolving preferences, preserving design intent. Pruning showcases care and safety while maintaining certain unkempt areas for wildlife habitats.

Nature reserve management

Regarding nature reserve management, the study's revelations regarding visitors' responses to genuine natural environments offer valuable insights. These insights encompass concerns when interacting with nature and perceptions of natural plant communities. Regarding concerns in natural settings, the study underscores the significance of maintaining essential human traces, environmental quality, and preserving users' personal space. In terms of perception, maintaining the existing complexity of natural vegetation can ensure users' engagement and restoration within the natural setting. Incorporating landscape diversity and necessary human elements at the periphery of these spaces, such as signage, plant introduction boards, and lighting, can mitigate monotony and enhance feelings of security. Furthermore, catering to the needs of vulnerable nature visitors within these natural settings, by providing features like handrails, seating, and first aid Points, becomes imperative.

Environmental education

Environmental education and our research findings have the potential to create a mutually beneficial relationship. Our insights can inform the development of public environmental education programs, enhancing individuals' connection with their natural surroundings and promoting wider acceptance of diverse and resilient sustainable naturalistic planting practices. As environmental education gains prominence, the public's understanding of ecological significance, including global environmental awareness, the necessity of species

diversity, and the importance of complex plant structures, can expand. This knowledge can also help individuals comprehend the slightly delayed visual impacts of long-term sustainable ecological development. Moreover, environmental education should encompass not only non-professionals but also professionals such as policymakers, urban planners, landscape designers, and greenspace managers to facilitate a diverse and inclusive greenspace establishment.

6.5. Scope for further research

Building upon the insights and limitations highlighted in this study, several promising avenues for future research emerge. While this study solely juxtaposed naturalistic planting against traditional Chinese planting and the natural environment, both naturalistic and conventional planting approaches can be further disaggregated based on their structure and character, akin to the methodology employed by Hoyle (2015). Subsequent investigations could delve into the applications of naturalistic planting within various typologies such as woodland, herbaceous, and shrub environments. As China's future green landscapes grow increasingly diverse, there exists an opportunity to gather a more comprehensive dataset encompassing distinct site categories. Furthermore, as virtual reality technology continues to advance, potential research may revolve around the perceptual and preferential aspects of digital landscapes. For instance, a comparative analysis between authentic naturalistic planting in the real world and virtual counterparts could be conducted to explore variances in perception within digital or virtual green spaces. This inquiry should encompass factors including visual fidelity, interactivity, and user engagement, thereby contributing insights within a progressively digital milieu.

Furthermore, this study did not extensively focus on native plant species due to inadequate public environmental education in distinguishing native species and exotic species. In light of the emergence of a national policy-level strategy advocating for ecological environment protection, over a mere two decades, heightened public environmental awareness suggests the inclusion of indigenous plants in research endeavours. Investigating the role and perceptual preferences of indigenous plants within the context of naturalistic planting could serve as a prospective avenue. Additionally, other facets of environmental education and ecological services could be integrated into the scope of the study, thus exploring the interrelationships with responses.

Perception and preference constitute an evolving process, susceptible to temporal fluctuations. Thus, for future considerations, a lengthier temporal span could be adopted to comprehend the dynamics of perception over time. Longitudinal studies may offer a nuanced perspective on the evolution of perceptions, considering

the influence of altering environmental conditions, maintenance methodologies, and the evolving values of individuals. Rapid urbanization in China has catalysed significant transformations in the lives of the middle-aged and elderly participants of this study. Their formative years were characterized by substantial exposure to natural surroundings, whereas younger participants currently express limited opportunities for such experiences. Future investigations should embrace a holistic view, encompassing not only the perceptions and preferences of the current greenspace users in middle and late adulthood but also anticipating potential shifts in the needs, perceptions, and preferences of the present-day young and middle-aged users as they transition into the older age groups.

Although this study undertook comparative analyses with literature findings from other countries, methodological disparities and temporal misalignments render these comparative results as reference points rather than direct counterparts. Hence, future collaborations with scholars from diverse countries could be envisaged to engender a more international outlook, facilitating cross-cultural examinations of perceptions of and preferences for naturalistic planting.

Furthermore, while this study ventured into the exploration of China's natural landscape culture, predominantly within the realms of interests in nature and perceptions, avenues remain for a more comprehensive investigation into how traditional cultural influences shape contemporary perspectives on nature and aesthetic preferences.

| Chapter 7 : References

Agresti, A. and Finlay, B. (1997) *Statistical methods for the social sciences*. 3rd ed. Upper Saddle River, N.J.; London: Prentice Hall.

Akbar, K.F., Hale, W.H.G. and Headley, A.D. (2003) 'Assessment of scenic beauty of the roadside vegetation in northern England', *Landscape and Urban Planning*, 63(3), pp. 139–144. doi:10.1016/S0169-2046(02)00185-8.

Albin, M. *et al.* (2008) 'Recreational values of the natural environment in relation to neighbourhood satisfaction, physical activity, obesity and wellbeing', *Epidemiol Community Health*, 2, pp. 1–7. doi:10.1136/jech.2007.062414.

Alizadeh, B. and Hitchmough, J.D. (2020) 'How will climate change affect future urban naturalistic herbaceous planting? The role of plant origin and fitness', *Urban Forestry and Urban Greening*, 54(May 2019), p. 126786. doi:10.1016/j.ufug.2020.126786.

Allard-Poesi, F. and Massu, J. (2023) 'Research Note: Is urban nature necessary for well-being? For whom? A necessary condition analysis', *Landscape and Urban Planning*, 234(June 2022), p. 104728. doi:10.1016/j.landurbplan.2023.104728.

Appleton, J. (1975) *The Experience of Landscape*. London: John Wiley.

Arnberger, A. and Haider, W. (2005) 'Social effects on crowding preferences of urban forest visitors', *Urban Forestry and Urban Greening*, 3(3–4), pp. 125–136. doi:10.1016/j.ufug.2005.04.002.

Aruta, J.J.B.R. and Pakingan, K.A. (2022) 'Validating nature relatedness scale in the Philippines: Social responsibility as a cultural driver on why nature relatedness promotes green purchase intention', *International Social Science Journal*, 72(245), pp. 635–654. doi:10.1111/issj.12338.

Baharudin, S. (2020) *Understanding Human Preferences for Naturalistic Tropical Urban Planting in Kuala Lumpur , Malaysia*.

Basak, S.M. *et al.* (2023) 'Perceptions and attitudes to understand human-wildlife conflict in an urban landscape-A systematic review', *Ecological Indicators*, 151(April), p. 110319. doi:10.1016/j.ecolind.2023.110319.

Beijing Baihua Mountain National Nature Reserve_Baidu (2021). Available at: https://baike.baidu.com/item/北京百花山国家级自然保护区/15984895?fromtitle=百花山&fromid=1076473 (Accessed: 6 May 2022).

Beijing Expo 2019 - Official Site (2019). Available at: https://www.horti-expo2019.com/ (Accessed: 12 May 2022).

Bell, S. (1999) *Landscape: pattern, perception and process*. London: E & FN Spon.

Berman, M.G., Jonides, J. and Kaplan, S. (2008) 'The Cognitive Benefits of Interacting With Nature | The Center for Health Design', *Psychological Science Research*, 19(12), pp. 1207–1212. doi:10.1111/j.1467-9280.2008.02225.x.

Bian, K.边凯 (2014) *Lun songdai shanshui hua zhong jing de zaixian yu jing de yingzao 论宋代山水画中景的再现与境的营造 [Discussion about the reappearance of the scenery and the construction of the landscape in the landscape painting in the Song Dynasty]*. China Central Academy of Fine Arts.

Bjerke, T. *et al.* (2006) 'Vegetation density of urban parks and perceived appropriateness for recreation', *Urban Forestry and Urban Greening*, 5(1), pp. 35–44. doi:10.1016/j.ufug.2006.01.006.

Boorman, A. (2004) 'The management of Amenity Grasslands', in Hitchmough, J. and Fieldhouse, K. (eds) *Plant User Handbook: A guide to effective specifying*. Oxford, UK: Blackwell Science, pp. 354–370.

Bourassa, S.C. (1991a) 'Cultural Rules', in *The Aesthetics of Landscape*. London: Belhaven Press, pp. 90–109.

Bourassa, S.C. (1991b) 'Personal Strategies', in *The Aesthetics of Landscape*. London: Belhaven Press, pp. 110–119.

Boyd, F. *et al.* (2018) 'Who doesn't visit natural environments for recreation and why: A population representative analysis of spatial, individual and temporal factors among adults in England', *Landscape and Urban Planning*, 175(March), pp. 102–113. doi:10.1016/j.landurbplan.2018.03.016.

Boyd, F. (2020) 'Tailoring Engagement with Urban Nature for University of Sheffield Students? Wellbeing', (January). Available at: http://etheses.whiterose.ac.uk/27418/.

Bratman, G.N. *et al.* (2019) 'Nature and mental health: An ecosystem service perspective', *Science Advances*, 5(7). doi:10.1126/sciadv.aax0903.

Bratman, G.N., Hamilton, J.P. and Daily, G.C. (2012) 'The impacts of nature experience on human cognitive function and mental health', *Annals of the New York Academy of Sciences*, 1249(1), pp. 118–136. doi:10.1111/j.1749-6632.2011.06400.x.

Bretelle-Establet, F. (2016) ' Concepts of Nature: A Chinese-European Cross-Cultural Perspective ', *East Asian*

Science, Technology and Society: An International Journal, 10(3), pp. 315–319. doi:10.1215/18752160-3442680.

Brindley, P. *et al.* (2019) 'Is more always better? Exploring field survey and social media indicators of quality of urban greenspace, in relation to health', *Urban Forestry and Urban Greening*, 39(January), pp. 45–54. doi:10.1016/j.ufug.2019.01.015.

Bryman, A. (2016) *Social research methods*. Fifth edit. Oxford, United Kingdom: Oxford University Press.

Buijs, A.E., Elands, B.H.M. and Langers, F. (2009) 'No wilderness for immigrants: Cultural differences in images of nature and landscape preferences', *Landscape and Urban Planning*, 91(3), pp. 113–123. doi:10.1016/j.landurbplan.2008.12.003.

Burgess, J., Harrison, C.M. and Limb, M. (1988) 'People, Parks and the Urban Green: A Study of Popular Meanings and Values for Open Spaces in the City', *Urban Studies*, 25(6), pp. 455–473. doi:10.1080/00420988820080631.

Buttel, F.H. and Flinn, W.L. (1978) 'Social class and mass environmental beliefs: A Reconsideration', *Environment and Behavior*, pp. 433–450. doi:10.1177/0013916578103008.

Cai, J.蔡劲松 (2019) 'Zhongguo shanshui hua ji shanshui jingshen de zhexue chanfa 中国山水画及山水精神的哲学阐发 [Philosophical Interpretation of Chinese Landscape Painting and Landscape Spirit]', *Journal of Beijing University of Aeronautics and Astronautics*, 32(1), pp. 78–83.

Calogiuri, G., Patil, G.G. and Aamodt, G. (2016) 'Is green exercise for all? A descriptive study of green exercise habits and promoting factors in adult Norwegians', *International Journal of Environmental Research and Public Health*, 13(11), pp. 1–18. doi:10.3390/ijerph13111165.

Cameron, R.W.F. *et al.* (2020) 'Where the wild things are! Do urban green spaces with greater avian biodiversity promote more positive emotions in humans?', *Urban Ecosystems*, 23(2), pp. 301–317. doi:10.1007/s11252-020-00929-z.

Cameron, R.W.F. and Hitchmough, J. (2016) *Environmental horticulture: science and management of green landscapes*. Wallingford, Oxfordshire, UK : CAB.

Capaldi A., C.A., Dopko L., R.L. and Zelenski, J.M. (2014) 'The relationship between nature connectedness and happiness: A meta-analysis', *Frontiers in Psychology*, 5(AUG), pp. 1–15. doi:10.3389/fpsyg.2014.00976.

Chambers, W. (1757) 'Of the Art of Laying Our Gardens Among the Chinese', in Rinaldi, B.M. (ed.) *Ideas of Chinese gardens : Western accounts, 1300-1860*. Pennsylvania: University of Pennsylvania Press, pp. 112–120.

Chen, B., Adimo, O.A. and Bao, Z. (2009) 'Assessment of aesthetic quality and multiple functions of urban green space from the users' perspective: The case of Hangzhou Flower Garden, China', *Landscape and Urban*

Planning, 93(1), pp. 76–82. doi:10.1016/j.landurbplan.2009.06.001.

Chen, C. (2016) *Zhongguo chuantong shanshui jianzhu jingguan yixiang yan jiu 中国传统山水建筑景观意象研究 [a Research on Chinese Traditional Architectural Landscape Image]*. Harbin Institute of Technology.

Chen, G. (2017) *Zhong Guo Jin Dai Shi 中国近代史 [Modern history of China]*. China Workers Publishing House 中国工人出版社.

Chen, M. (2009) 'Zhongguo fengjing yuanlin yu shanshui wenhua lun 中国风景园林与山水文化论 [On Chinese Landscape Architecture and Landscape Culture]', *Chinese landscape Architecture 中国园林*, pp. 29–32.

Chen, Y. *et al.* (2016) 'Landscape perception based on personal attributes in determining the scenic beauty of in-stand natural secondary forests', *Annals of Forest Research*, 59(1), pp. 91–103. doi:10.15287/afr.2015.440.

Chen, Z.陈子颖 (2019) '"Gao qing gan" xia de shanshui guan, shanshui hua yu yuanlin goucheng yinzi guanxi tanjiu "高情感"下的山水观、山水画与园林构成因子关系探究[Exploration the Composition Factors of Landscape View, Painting and Garden under "High Touch"]', *Journal ofShandongAgricultural University*, 50(4), pp. 720–723.

Chiang, Y., Li, D. and Jane, H. (2017) 'Wild or tended nature? The effects of landscape location and vegetation density on physiological and psychological responses', *Landscape and Urban Planning*, 167(June), pp. 72–83. doi:10.1016/j.landurbplan.2017.06.001.

Choe, E.Y., Jorgensen, A. and Sheffield, D. (2020) 'Does a natural environment enhance the effectiveness of Mindfulness-Based Stress Reduction (MBSR)? Examining the mental health and wellbeing, and nature connectedness benefits', *Landscape and Urban Planning*, 202(June 2019), pp. 1–12. doi:10.1016/j.landurbplan.2020.103886.

Choudhry, K.Z. *et al.* (2015) 'A review of methodologies used in studies investigating human behaviour as determinant of outcome for exposure to "naturalistic and urban environments"', *Urban Forestry and Urban Greening*, 14(3), pp. 527–537. doi:10.1016/j.ufug.2015.03.007.

Cleary, A. *et al.* (2020) *Predictors of Nature Connection Among Urban Residents: Assessing the Role of Childhood and Adult Nature Experiences*, *Environment and Behavior*. doi:10.1177/0013916518811431.

Cohen, J. (1988) *Statistical power analysis for the behavioral sciences*. 2nd ed. New York: Hillsdale, NJ : Lawrence Erlbaum Associate. doi:https://doi.org/10.4324/9780203771587.

Colley, K., Brown, C. and Montarzino, A. (2016) 'Restorative wildscapes at work: an investigation of the wellbeing benefits of greenspace at urban fringe business sites using "go-along" interviews', *Landscape Research*, 41(6), pp. 598–615. doi:10.1080/01426397.2016.1197191.

Colley, K. and Craig, T. (2019) 'Natural places: Perceptions of wildness and attachment to local greenspace', *Journal of Environmental Psychology*, 61(October 2017), pp. 71–78. doi:10.1016/j.jenvp.2018.12.007.

Comrey, A.. (1973) *A first course in factor analysis*. New York; London: Academic Press.

Cordell, H.K. and Hendee, J.C. (1982) *Renewable resources recreation in the United States: Supply, demand and critical policy issues*. Washington DC: American Forestry Association.

Cortinovis, C. *et al.* (2022) 'Scaling up nature-based solutions for climate-change adaptation: Potential and benefits in three European cities', *Urban Forestry and Urban Greening*, 67. doi:10.1016/j.ufug.2021.127450.

Cottet, M. *et al.* (2018) 'Using gaze behavior to gain insights into the impacts of naturalness on city dwellers' perceptions and valuation of a landscape', *Journal of Environmental Psychology*, 60(July), pp. 9–20. doi:10.1016/j.jenvp.2018.09.001.

Craik, K.H. (1983) 'A Role Theoretic Analysis of Scenic Quality Judgments', in R. ID. Rowe, and L.G.C. (ed.) *Managing Air Quality And Scenic Resources At National Parks And Wilderness Areas*. 1st Editio. Boulder: Westview Press, p. 117.

Craik, K.H. (1986) 'Psychological reflections on landscape', in *Landscape meanings and values*. London: Allen & Unwin, pp. 48–64.

Crow, T., Brown, T. and De Young, R. (2006) 'The Riverside and Berwyn experience: Contrasts in landscape structure, perceptions of the urban landscape, and their effects on people', *Landscape and Urban Planning*, 75(3–4), pp. 282–299. doi:10.1016/j.landurbplan.2005.04.002.

Dandy, N. and Van Der Wal, R. (2011) 'Shared appreciation of woodland landscapes by land management professionals and lay people: An exploration through field-based interactive photo-elicitation', *Landscape and Urban Planning*, 102(1), pp. 43–53. doi:10.1016/j.landurbplan.2011.03.008.

Davis, N. and Gatersleben, B. (2013) 'Transcendent experiences in wild and manicured settings: The influence of the trait "connectedness to nature"', *Ecopsychology*, 5(2), pp. 92–102. doi:10.1089/eco.2013.0016.

DeGroot, W.T. and Van den Born, R.J.G. (2003) 'Visions of nature and landscape type preferences: An exploration in The Netherlands', *Landscape and Urban Planning*, 63(3), pp. 127–138. doi:10.1016/S0169-2046(02)00184-6.

DelaFuente de Val, G. (2023) 'The effect of spontaneous wild vegetation on landscape preferences in urban green spaces', *Urban Forestry and Urban Greening*, 81(February), p. 127863. doi:10.1016/j.ufug.2023.127863.

DelaFuente de Val, G., Atauri, J.A. and de Lucio, J. V. (2006) 'Relationship between landscape visual attributes and spatial pattern indices: A test study in Mediterranean-climate landscapes', *Landscape and Urban Planning*,

77(4), pp. 393–407. doi:10.1016/j.landurbplan.2005.05.003.

DiStefano, C., Zhu, M. and Mîndrilă, D. (2009) 'Understanding and using factor scores: Considerations for the applied researcher', *Practical Assessment, Research and Evaluation*, 14(20).

Drisko, J.W. (2015) *Content analysis*. New York: Oxford University Press.

Du, H. *et al.* (2016) 'Assessing the Visual Aesthetic Quality of Vegetation Landscape in Urban Green Space from a Visitor's Perspective', *Journal of Urban Planning and Development*, 142(3), p. 04016007. doi:10.1061/(asce)up.1943-5444.0000329.

Duan, J.段菁晖 (2013) *View of Nature in XieLingyun's Mountain-and-water Poetry 谢灵运山水诗的自然观.*

Dunlap, R.E. *et al.* (2000) 'Measuring endorsement of the new ecological paradigm: A revised NEP scale', *Journal of Social Issues*, 56(3), pp. 425–442. doi:10.1111/0022-4537.00176.

Dunnett, N. (2004) 'The dynamic nature of plant communities-pattern and process in designed plant communities', in *The Dynamic Landscape: Design, Ecology and Management of Naturalistic Urban Planting*. London: Spon Press, pp. 97–114.

Dunnett, N. (2019) *Naturalistic Planting Design:The Essential Guide*. Bath : Filbert Press.

Dunnett, N. and Hitchmough, J. (2004) 'Introduction to naturalistic planting in urban landscapes', in *The Dynamic Landscape: Design, Ecology and Management of Naturalistic Urban Planting*. London: Spon Press, pp. 1–22.

Elliot, R. (1997) *Faking Nature: The Ethics of Environmental Restoration*. London; New York: Routledge.

Ellison, A. (2014) 'Preserving the Picturesque: Perceptions of Landscape, Landscape Art, and Land Protection in the United States and China', *Land*, 3(1), pp. 260–281. doi:10.3390/land3010260.

Fan, Y.范宇光 (2019) *Shufa meixue fanchou tixi yanjiu 书法美学范畴体系研究 [A Study on Category System of Calligraphy Aesthetics]*. Hebei University.

Fengtai District Toponymic Records Editorial Committee (1993) *Beijingshi fengtai qu dimingzhi 北京市丰台区地名志 [Toponymic records of Fengtai District of Beijing]*. Beijing Publishing house 北京出版社.

Fischer, L.K. *et al.* (2018) 'Beyond green: Broad support for biodiversity in multicultural European cities', *Global Environmental Change*, 49(January), pp. 35–45. doi:10.1016/j.gloenvcha.2018.02.001.

Fischer, L.K. *et al.* (2020) 'Public attitudes toward biodiversity-friendly greenspace management in Europe', *Conservation Letters*, 13(4), pp. 1–12. doi:10.1111/conl.12718.

Fisher, J.C. *et al.* (2021) 'Perceived biodiversity, sound, naturalness and safety enhance the restorative quality and wellbeing benefits of green and blue space in a neotropical city', *Science of the Total Environment*, 755, p. 143095. doi:10.1016/j.scitotenv.2020.143095.

Fodor, I.K. (2002) 'A survey of dimension reduction techniques', (1), pp. 1–18.

Forbes, S., Cooper, D. and Kendle, A.D. (1997) 'The history and development of ecological landscape styles', in *Urban Nature Conservation : Landscape Management in the Urban Countryside*. New york: Taylor & Francis, pp. 69–113.

Fuller, R.A. *et al.* (2007) 'Psychological benefits of greenspace increase with biodiversity', (May), pp. 390–394. doi:10.1098/rsbl.2007.0149.

Fung, C.K.W. and Jim, C.Y. (2019) 'Microclimatic resilience of subtropical woodlands and urban-forest benefits', *Urban Forestry and Urban Greening*, 42(May), pp. 100–112. doi:10.1016/j.ufug.2019.05.014.

Gai, S. *et al.* (2022) 'Users' views on cultural ecosystem services of urban parks: An importance-performance analysis of a case in Beijing, China', *Anthropocene*, 37(October 2021), p. 100323. doi:10.1016/j.ancene.2022.100323.

Gallagher, W. (2007) *The power of place: how our surroundings shape our thoughts, emotions, and actions*. New York, London: Harper Perennial.

Ganji, F. (2018) *Everyday Interculturalism in Urban Public Open Spaces : A Socio-spatial Inquiry in Bradford City*, *Phd*.

Germino, M.J. *et al.* (2001) 'Estimating visual properties of rocky mountain landscapes using GIS', *Landscape and Urban Planning*, 53(1–4), pp. 71–83. doi:10.1016/S0169-2046(00)00141-9.

Goodin, R.E. (1992) *Green political theory*. Cambridge: Polity Press.

Guan, C.管才君 (2016) *A Study of Aesthetic Concepts of Nature in Wei and Jin 魏晋自然审美观念研究*.

Guo, C.郭婵 (2022) 'The inheritance and development of Chinese garden in modern landscape 中式园林在现代景观中的传承与发展', *Agriculture and technology 农业与技术*, 42(14), pp. 125–127.

Gustafsson, J. *et al.* (2021) 'Parental mental well-being and frequency of adult-child nature visits: The mediating roles of parents' perceived barriers', *International Journal of Environmental Research and Public Health*, 18(13). doi:10.3390/ijerph18136814.

Hacker, J. (2004) 'Amenity and Sport Turf Seed', in Hitchmough, J. and Fieldhouse, K. (eds) *Plant User Handbook: A guide to effective specifying*. Oxford, UK: Blackwell Science, pp. 343–353.

Han, C. (2012) 'The aesthetics of wandering in the Chinese literati garden', *Studies in the History of Gardens and Designed Landscapes*, 32(4), pp. 297–301. doi:10.1080/09668136.2012.721995.

Han, F. (2006) *The Chinese view of nature: tourism in China's scenic and historic interest areas*, *School of Design Faculty of Built Environment and Engineering Queensland University of Technology*. Available at: https://core.ac.uk/download/pdf/10885179.pdf.

Hargrove, E.C. (1989) *Foundations of Environmental Physics*. Denton: Environmental Ethics Books.

Harris, V. *et al.* (2018) 'Green space context and vegetation complexity shape people's preferences for urban public parks and residential gardens', *Landscape Research*, 43(1). doi:10.1080/01426397.2017.1302571.

Hartig, T. *et al.* (2014) 'Nature and health', *Annual Review of Public Health*, 35, pp. 207–228. doi:10.1146/annurev-publhealth-032013-182443.

Hashim, N.H.M. *et al.* (2016) 'A Perceptual Study on the Influence of Vegetation Design Towards Women's Safety in Public Park', *Procedia - Social and Behavioral Sciences*, 234, pp. 280–288. doi:10.1016/j.sbspro.2016.10.244.

He, M. and Zhao, J. (2022) 'ZhongGuo XianDai FengJing YuanLin LiShi FenQi YanJiu 中国现代风景园林历史分期研究 [Research on the Historical Phases of Chinese Modern Landscape Architecture]', *Landscape Architecture 风景园林*, 29(9), pp. 76–83.

Heatherington, C. (2015) *Perceptions of landscape continuity and change*. University of Sheffield. doi:10.1055/s-2008-1040325.

Heerwagen, J. and Orians, G. (1995) 'Humans, habitats and aesthetics', in Kellert, S. and Wilson, E. (eds) *The biophilia hypothesis*. Washington, DC: Island Press, pp. 138–172.

Henderson, S.P.B., Perkins, N.H. and Nelischer, M. (1998) 'Residential lawn alternatives: A study of their distribution, form and structure', *Landscape and Urban Planning*, 42(2–4), pp. 135–145. doi:10.1016/S0169-2046(98)00084-X.

Herzog, T.R. *et al.* (2000) 'Cultural and Developmental Comparisons of Landscape Perceptions and Preferences', *Environment and Behavior*, 32(3), pp. 323–346. doi:10.1177/0013916500323002.

Herzog, T.R. and Kropscott, L.S. (2004) 'Legibility, mystery, and visual access as predictors of preference and perceived danger in forest settings without pathways', *Environment and Behavior*, 36(5), pp. 659–677. doi:10.1177/0013916504264138.

Heyman, E. *et al.* (2011) 'Openness as a key-variable for analysis of management trade-offs in urban woodlands', *Urban Forestry and Urban Greening*, 10(4), pp. 281–293. doi:10.1016/j.ufug.2011.07.003.

Hitchmough, J. (2004a) 'Herbaceous Perennials', in Hitchmough, J. and Fieldhouse, K. (eds) *Plant User Handbook: A guide to effective specifying*. Oxford, UK: Blackwell Science, pp. 325–342.

Hitchmough, J. (2004b) 'Naturalistic herbaceous vegetation for urban landscapes', in *The Dynamic Landscape: Design, Ecology and Management of Naturalistic Urban Planting*. London: Spon Press, pp. 130–183.

Hitchmough, J. (2008) 'New Approach To Ecological Planting Design UK', *Cities and the Environment*, 1(2), pp. 1–15.

Hitchmough, J. (2017a) 'Introduction', in *Sowing beauty: Designing Flower Meadows from Seed*. Portland: Timber Press, pp. 8–31.

Hitchmough, J. (2017b) *Sowing beauty : designing flowering meadows from seed*. Portland: Timber Press.

Hitchmough, J. and Fleur, M. de la (2006) 'Establishing North American prairie vegetation in urban parks in northern England: Effect of management and soil type on long-term community development', *Landscape and Urban Planning*, 78(4), pp. 386–397. doi:10.1016/j.landurbplan.2005.11.005.

Hitchmough, J., De La Fleur, M. and Findlay, C. (2004) 'Establishing North American prairie vegetation in urban parks in northern England: Part 1. Effect of sowing season, sowing rate and soil type', *Landscape and Urban Planning*, 66(2), pp. 75–90. doi:10.1016/S0169-2046(03)00096-3.

Hitchmough, J. and Stuart-Smith, T. (2019) 'Xinsichou Zhi Lu 新丝绸之路 [The New Silk Road] ', *World Architecture 世界建筑*, 8.

Hitchmough, J. and Woudstra, J. (1999) 'The ecology of exotic herbaceous perennials grown in managed, native grassy vegetation in urban landscapes', *Landscape and Urban Planning*, 45(2–3), pp. 107–121. doi:10.1016/S0169-2046(99)00031-6.

Holt, E.W. *et al.* (2019) 'Active and passive use of green space, health, and well-being amongst university students', *International Journal of Environmental Research and Public Health*, 16(3). doi:10.3390/ijerph16030424.

Hope, D. *et al.* (2003) 'Socioeconomics drive urban plant diversity', 100(15), pp. 8788–8792. doi:10.1073/pnas.1.

Howley, P. (2011) 'Landscape aesthetics: Assessing the general publics' preferences towards rural landscapes', *Ecological Economics*, 72, pp. 161–169. doi:10.1016/j.ecolecon.2011.09.026.

Hoyle, H. (2015) *Human happiness versus urban biodiversity? Public perception of designed urban planting in a warming climate*. University of Sheffield. Available at: http://etheses.whiterose.ac.uk/10738/?utm_term=wreo&utm_source=twitterfeed&utm_medium=twitter.

Hoyle, H. *et al.* (2017) '"Not in their front yard" The opportunities and challenges of introducing perennial urban meadows: A local authority stakeholder perspective', *Urban Forestry and Urban Greening*, 25, pp. 139–149. doi:10.1016/j.ufug.2017.05.009.

Hoyle, H. *et al.* (2018) 'Plant species or flower colour diversity? Identifying the drivers of public and invertebrate response to designed annual meadows', *Landscape and Urban Planning*, 180(December 2017), pp. 103–113. doi:10.1016/j.landurbplan.2018.08.017.

Hoyle, H. (2020) 'What Is Urban Nature and How Do We Perceive It?', in *Naturally Challenged: Contested Perceptions and Practices in Urban Green Spaces*, pp. 9–36. doi:10.1007/978-3-030-44480-8_2.

Hoyle, H. (2021) 'Climate-adapted, traditional or cottage-garden planting? Public perceptions, values and socio-cultural drivers in a designed garden setting', *Urban Forestry and Urban Greening*, 65(September), p. 127362. doi:10.1016/j.ufug.2021.127362.

Hoyle, H., Hitchmough, J. and Jorgensen, A. (2017a) 'All about the "wow factor"? The relationships between aesthetics, restorative effect and perceived biodiversity in designed urban planting', *Landscape and Urban Planning*, 164, pp. 109–123. doi:10.1016/j.landurbplan.2017.03.011.

Hoyle, H., Hitchmough, J. and Jorgensen, A. (2017b) 'Attractive, climate-adapted and sustainable? Public perception of non-native planting in the designed urban landscape', *Landscape and Urban Planning*, 164, pp. 49–63. doi:10.1016/j.landurbplan.2017.03.009.

Hoyle, H., Jorgensen, A. and Hitchmough, J.D. (2019) 'What determines how we see nature? Perceptions of naturalness in designed urban green spaces', *People and Nature*, (October 2018), pp. 1–14. doi:10.1002/pan3.19.

Hu, S. (1953) 'Ch'an (Zen) Buddhism in China Its History and Method', *University of Hawai'i Press*, 3(1), pp. 3–24.

Huang, D.黄丹麾 (2020) 'Lun Zhong Guo Gu Dai Shu Fa Mei Xue De Zi Ran Guan 论中国古代书法美学的"自然观"[On the Natural View of Ancient Chinese Calligraphy Aesthetics]', *University Calligraphy 大学书法*, pp. 105–110.

Huang, G. *et al.* (2023) 'The impact of air pollution on behavior changes and outdoor recreation in Chinese cities', *Landscape and Urban Planning*, 234(February), p. 104727. doi:10.1016/j.landurbplan.2023.104727.

Hughes, J. *et al.* (2019) 'Age and connection to nature: when is engagement critical?', *Frontiers in Ecology and the Environment*, 17(5), pp. 265–269. doi:10.1002/fee.2035.

Jansson, M. *et al.* (2013) 'Perceived personal safety in relation to urban woodland vegetation - A review',

Urban Forestry and Urban Greening, 12(2), pp. 127–133. doi:10.1016/j.ufug.2013.01.005.

Jia, H.贾红波 and Xian, F.咸锋 (2021) 'Baihuashan guojiaji ziran baohuqu mengguli linqunluo tezheng fenxi 百花山国家级自然保护区蒙古栎林群落特征分析 [Study on the Community Characteristics of Quercus mongolica Forest in Baihuashan National Nature Reserve]', *Forest Resources Management 林业资源管理*, 3, pp. 84–88.

Jiang, Y. and Yuan, T. (2017) 'Public perceptions and preferences for wildflower meadows in Beijing, China', *Urban Forestry and Urban Greening*, 27(35), pp. 324–331. doi:10.1016/j.ufug.2017.07.004.

Jim, C.Y. (2011) 'Holistic research agenda for sustainable management and conservation of urban woodlands', *Landscape and Urban Planning*, 100(4), pp. 375–379. doi:10.1016/j.landurbplan.2011.01.006.

Jim, C.Y. and Chen, W.Y. (2006) 'Perception and attitude of residents toward urban green spaces in Guangzhou (China)', *Environmental Management*, 38(3), pp. 338–349. doi:10.1007/s00267-005-0166-6.

Jong, K. De, Albin, M. and Sk, E. (2012) 'Perceived green qualities were associated with neighborhood satisfaction, physical activity, and general health: Results from a cross-sectional study in suburban and rural Scania, southern Sweden', *Health & Place*, 18, pp. 1374–1380. doi:10.1016/j.healthplace.2012.07.001.

Jorgensen, A. (2003) *Living in the urban wild woods - a case study of the ecological woodland approach to landscape planning and design at Birchwood, Warrington New Town (2)*.

Jorgensen, A. (2004) 'The social and cultural context of ecological plantings', in *The Dynamic Landscape: Design, Ecology and Management of Naturalistic Urban Planting*. London: Spon Press, pp. 293–325.

Jorgensen, A. and Anthopoulou, A. (2007) 'Enjoyment and fear in urban woodlands - Does age make a difference?', *Urban Forestry and Urban Greening*, 6(4), pp. 267–278. doi:10.1016/j.ufug.2007.05.004.

Jorgensen, A., Hitchmough, J. and Calvert, T. (2002) 'Woodland spaces and edges: Their impact on perception of safety and preference', *Landscape and Urban Planning*, 60(3), pp. 135–150. doi:10.1016/S0169-2046(02)00052-X.

Jorgensen, A., Hitchmough, J. and Dunnett, N. (2007) 'Woodland as a setting for housing-appreciation and fear and the contribution to residential satisfaction and place identity in Warrington New Town, UK', *Landscape and Urban Planning*, 79(3–4), pp. 273–287. doi:10.1016/j.landurbplan.2006.02.015.

Jorgensen, A. and Keenan, R. (2012) *Urban Wildscapes*. London: Routledge.

Joye, Y., Lange, F. and Fischer, M. (2022) 'Does beautiful nature motivate to work? Outlining an alternative pathway to nature-induced cognitive performance benefits', *New Ideas in Psychology*, 66(April), p. 100946. doi:10.1016/j.newideapsych.2022.100946.

Kaiser, H.F. and Rice, J. (1974) 'Little Jiffy, Mark Iv', *Educational and Psychological Measurement*, 34(1), pp. 111–117. doi:10.1177/001316447403400115.

Kaplan, R. (1977) 'Preference and Everyday Nature: Method and Application', *Perspectives on Environment and Behavior*, pp. 235–250. doi:10.1007/978-1-4684-2277-1_11.

Kaplan, R. (1984) 'Impact of urban nature: A theoretical analysis', *Urban Ecology*, 8(3), pp. 189–197. doi:10.1016/0304-4009(84)90034-2.

Kaplan, R. and Kaplan, S. (1989) *The experience of nature: a psychological perspective*. Cambridge: Cambridge University Press.

Kaplan, S. and Berman, M.G. (2013) 'Perspectives on Psychological Science'. doi:10.1177/1745691609356784.

Karjalainena, E. and TyrvaÈinen, L. (2001) 'Visualization in forest landscape preference research: a Finnish perspective', *Landscape and Urban Planning*, pp. 13–28. doi:10.1007/BF01189620.

Kendal, D., Williams, K.J.H. and Williams, N.S.G. (2012) 'Plant traits link people's plant preferences to the composition of their gardens', *Landscape and Urban Planning*, 105(1–2), pp. 34–42. doi:10.1016/j.landurbplan.2011.11.023.

Kendle, T. and Forbes, S. (1997) *Urban Nature Conservation: Landscape Management in the Urban Countryside*. New york: Taylor & Francis.

Keniger, L.E. *et al.* (2013) 'What are the benefits of interacting with nature?', *International Journal of Environmental Research and Public Health*, 10(3), pp. 913–935. doi:10.3390/ijerph10030913.

Keswick, M. (1978) *The Chinese Garden： History, Art, and Architecture*. Second. London: Academy Editions / New York: St. Martin's Press.

Khew, J.Y.T., Yokohari, M. and Tanaka, T. (2014) 'Public perceptions of nature and landscape preference in Singapore', *Human Ecology*, 42(6), pp. 979–988. doi:10.1007/s10745-014-9709-x.

Kingsbury, N. (2004) 'Contemporary overview of naturalistic planting design', in *The Dynamic Landscape: Design, Ecology and Management of Naturalistic Urban Planting*. London: Spon Press, pp. 58–96.

Knez, I. *et al.* (2018) 'Wellbeing in urban greenery: The role of naturalness and place identity', *Frontiers in Psychology*, 9(APR). doi:10.3389/fpsyg.2018.00491.

Kolasa, J. and Rollo, C.D. (1991) 'Introduction: The Heterogeneity of Heterogeneity: A Glossary', in Kolasa, J. and Pickett, S.T.A. (eds) *Ecological Heterogeneity*. New York: Springer-Verlag, pp. 1–23. doi:10.1007/978-1-4612-3062-5_1.

Koole, S.L. and Van den Berg, A.E. (2005) 'Lost in the wilderness: Terror management, action orientation, and nature evaluation', *Journal of Personality and Social Psychology*, 88(6), pp. 1014–1028. doi:10.1037/0022-3514.88.6.1014.

Kothencz, G. *et al.* (2017) 'Urban green space perception and its contribution to well-being', *International Journal of Environmental Research and Public Health*, 14(7). doi:10.3390/ijerph14070766.

Kövi, Z. *et al.* (2023) 'Cross-cultural validity of the Nature Relatedness Scale (NR-6) and links with wellbeing', 13(6), pp. 45–76.

Krapez, A., Hughes, M. and Newsome, D. (2021) 'Perceptions of "naturalness" by urban park visitors: Insights from Perth, Western Australia', *International Journal of Geoheritage and Parks*, 9(4), pp. 450–462. doi:10.1016/j.ijgeop.2021.11.004.

Krenichyn, K. (2006) '"The only place to go and be in the city ": women talk about exercise , being outdoors, and the meanings of a large urban park', *Health & Place*, 12, pp. 631–643. doi:10.1016/j.healthplace.2005.08.015.

Lamb, R.J. and Purcell, A.T. (1990) 'Perception of naturalness in landscape and its relationship to vegetation structure', *Landscape and Urban Planning*, 19(4), pp. 333–352. doi:10.1016/0169-2046(90)90041-Y.

Lampinen, J. *et al.* (2021) 'Acceptance of near-natural greenspace management relates to ecological and socio-cultural assigned values among European urbanites', 50, pp. 119–131. doi:10.1016/j.baae.2020.10.006.

Lappi, O. (2015) 'Eye tracking in the wild: The good, the bad and the ugly', *Journal of Eye Movement Research*, 8(5), pp. 1–21. doi:10.16910/jemr.8.5.1.

Lavorel, S. *et al.* (1997) 'Plant functional classifications- from general groups to specific groups based on response to disturbance', *Trends in Ecology & Evolution*, 12(12), pp. 474–478.

Lenaerts, A. *et al.* (2021) 'Vitamin Nature: How Coronavirus Disease 2019 Has Highlighted Factors Contributing to the Frequency of Nature Visits in Flanders, Belgium', *Frontiers in Public Health*, 9(May), pp. 1–9. doi:10.3389/fpubh.2021.646568.

Lhomme-Duchadeuil, A. (2018) 'Urban naturalistic meadows to promote cultural and regulating ecosystem services', (January). Available at: http://etheses.whiterose.ac.uk/21295/.

Li, J. and Nassauer, J.I. (2020) 'Cues to care: A systematic analytical review', *Landscape and Urban Planning*, 201(May). doi:10.1016/j.landurbplan.2020.103821.

Li, J., Tong, Y. and Li, M. (2020) 'Study on the Development Spatiotemporal Pattern of the Modern Public Garden & Park Construction in Chinese Major Cities', *World Journal of Forestry*, 09(01), pp. 17–25.

doi:10.12677/wjf.2020.91003.

Li, J.李娟 and Wang, Y.王昳 (2008) 'Ru dao shi zhexue sixiang yu zhongguo gudian yuanlin yishu jingshen zhi shengcheng 儒道释哲学思想与中国古典园林艺术精神之生成 [Confucianism Taoism Buddhism and the Generating of Chinese Classical Garden Art Spirit]', *Journal of Hefei University of Technology合肥工业大学学报(社会科学版)*, 22(3), pp. 160–164.

Li, J.李金坤 (2011) 'Tangshi shanshui ziran shengtai zhi shenmei jiazhi 唐诗山水自然生态之审美价值 [The aesthetic value of natural ecology in Tang Poetry]', *Journal of Shenzhen University*, 28(1), pp. 100–106.

Li, W. (2019) 'Shan Shui Wen Hua Guan Zhao Xia De Xian Dai She Ji Li Nian 山水文化观照下的现代设计理念 Modern [Design Concept under the View of Chinese Landscape Culture]', *Journal of Changchun University*, 29(3).

Li, X. *et al.* (2019) 'Residents' ecological and aesthetical perceptions toward spontaneous vegetation in urban parks in China', *Urban Forestry & Urban Greening*, 44(May), p. 126397. doi:10.1016/j.ufug.2019.126397.

Li, X.李旭佳 (2009) 'Zhongguo gudian yuanlin de gexing-qianxi ru, shi, dao dui zhongguo gudian yuanlin de yingxiang 中国古典园林的个性-浅析儒、释、道对中国古典园林的影响 [The Identities of Chinese Traditional Gardens ： An Analysis of the Impact of Confucianism,Buddhism and Taoism on Chinese Tradition', *Huazhong Architecture 华中建筑*, 27, pp. 178–181. doi:10.13942/j.cnki.hzjz.2009.07.048.

Liao, L. (2020) 'Lun Shan Shui Wen Hua Yuan Su Zai Xian Dai Huan Jing She Ji Zhong De Ying Yong 论山水文化元素在现代环境设计中的应用 [The application of landscape culture elements in modern environmental design]', *Art education researh*, pp. 86–87.

Lin, C.林聪田 *et al.* (2021) 'Zhongguo Wuzhong Duoyangxing de Daguo 中国物种多样性的大国 [China, large country of species diversity]', *Forest and Human 森林与人类*, 09, pp. 22–45.

Lindemann-matthies, P. (2002) 'The Influence of an Educational Program on Children's Perception of Biodiversity', *The Journal of Environmental Education*, 33(2), pp. 22–31. doi:10.1080/00958960209600805.

Lindén, J. *et al.* (2023) 'Air pollution removal through deposition on urban vegetation: The importance of vegetation characteristics', *Urban Forestry and Urban Greening*, 81. doi:10.1016/j.ufug.2023.127843.

Litleskare, S. and Calogiuri, G. (2023) 'Nature visits during the COVID-19 pandemic in Norway: Facilitators, motives, and associations with sociodemographic characteristics', *Frontiers in Public Health*, 11. doi:10.3389/fpubh.2023.1138915.

Liu, B.刘波 (2005) 'Ping Dan Zi Ran Yu Shen Hou Chun Mei De Tong Yi - Cong 《Gui Yuan Tian Ju》 Kan Tao

Yuan Ming Tian Yuan Shi De Yi Shu Feng Ge 平淡自然与深厚醇美的统一--从《归园田居》看陶渊明田园诗的艺术风格 [A Unity of Being Plain and Natural and Being Deep and Mellow]', *Journal of Nantong Vocational College 南通职业大学学报*, 19(1).

Liu, C. (2010) *Zong He Xing Gong Yuan Jing Guan De Gan Zhi Qing Xiang Yu Shen Mei Cha Yi Yan Jiu 综合性公园景观的感知倾向与审美差异研究 [Research on the Perceived Inclination and the Aesthetic Differences of Park Landscape]*. Northeast Agricultural University 东北林业大学.

Liu, M. and Schroth, O. (2019) 'Assessment of Aesthetic Preferences in Relation to Vegetation-Created Enclosure in Chinese Urban Parks: A Case Study of Shenzhen Litchi Park', *Sustainability*, 11(6), p. 1809. doi:10.3390/su11061809.

Liu, S.刘绍瑾 (1998) 'Shanshui wenhua yu zhongguo meixue chuantong 山水文化与中国美学传统 [Shanshui culture and Chinese aesthetic tradition]', *Journal of Jinan University*, 20(3), pp. 55–62.

Liu, X. *et al.* (2022) 'How to resolve the conflicts of urban functional space in planning: A perspective of urban moderate boundary', *Ecological Indicators*, 144(September), p. 109495. doi:10.1016/j.ecolind.2022.109495.

Liu, X. and Mu, R. (2016) 'Public environmental concern in China: Determinants and variations', *Global Environmental Change*, 37, pp. 116–127. doi:10.1016/j.gloenvcha.2016.01.008.

Liu, X.刘璇 (2013) *Suzhou sijia yuanlin zaoyuan yaosu de xiangzheng wenhua yanjiu 苏州私家园林造园要素的象征文化研究 [The research for Symbolic Culture of Suzhou private garcien's gardening elements]*. Northeast Forestry University.

López-Martínez, F. (2017) 'Visual landscape preferences in Mediterranean areas and their socio-demographic influences', *Ecological Engineering*, 104, pp. 205–215. doi:10.1016/j.ecoleng.2017.04.036.

Lotus Lake (Beijing Lotus Lake Park)_Baidu (2021). Available at: https://baike.baidu.com/item/莲花池/8054803?fr=aladdin#reference-[5]-19231938-wrap (Accessed: 18 May 2022).

Lu, Y. *et al.* (2019) 'Temporal-spatial evolution of the urban ecological footprint based on net primary productivity: A case study of Xuzhou central area, China', *Sustainability (Switzerland)*, 11(1). doi:10.3390/su11010199.

Luo, T. *et al.* (2018) 'Measuring and Understanding Public Perception of Preference for Ordinary Landscape in the Chinese Context: Case Study from Wuhan', *Journal of Urban Planning and Development*, 145(1), p. 05018021. doi:10.1061/(asce)up.1943-5444.0000492.

Luque-Gil, A.M., Gómez-Moreno, M.L. and Peláez-Fernández, M.A. (2018) 'Starting to enjoy nature in Mediterranean mountains: Crowding perception and satisfaction', *Tourism Management Perspectives*,

25(August 2016), pp. 93–103. doi:10.1016/j.tmp.2017.11.006.

Lyons, E. (1983) 'Demographic Correlates of Landscape Preference', *Environment and Behavior*, 15(4), pp. 487–511. doi:10.1177/0013916583154005.

Mao, H.毛华松, Wang, X.王雪纯 and Wu, Y.吴映华夏 M. (2021) 'Jindai chengshi shanshui fengjing gongyuan hua: Renzhi, yingjian yu shigong 近代城市山水风景公园化：认知、营建与事功 [Park-Oriented Development of Modern Urban Landscape: Cognition, Construction and Achievements]', *Landscape Architecture 风景园林*, 28(6), pp. 25–31.

Maple, T.L. and Morris, M.C. (2018) *Behavioral Impact of Naturalistic and Wilderness Settings*, *Environmental Psychology and Human Well-Being: Effects of Built and Natural Settings*. Elsevier Inc. doi:10.1016/B978-0-12-811481-0.00010-X.

Marselle, M.R. *et al.* (2021) 'Pathways linking biodiversity to human health: A conceptual framework', *Environment International*, 150(January). doi:10.1016/j.envint.2021.106420.

Mayer, F.S. and Frantz, C.M.P. (2004) 'The connectedness to nature scale: A measure of individuals' feeling in community with nature', *Journal of Environmental Psychology*, 24(4), pp. 503–515. doi:10.1016/j.jenvp.2004.10.001.

Misgav, A. (2000) 'Visual preference of the public for vegetation groups in Israel', *Landscape and Urban Planning*, 48, pp. 143–159.

Mohamad Muslim, H.F. *et al.* (2018) 'Nature experience promotes preference for and willingness to coexist with wild animals among urban and suburban residents in Malaysia', *Ecological Processes*, 7(1). doi:10.1186/s13717-018-0127-7.

Muratet, A. *et al.* (2015) 'Perception and knowledge of plant diversity among urban park users', *Landscape and Urban Planning*, 137, pp. 95–106. doi:10.1016/j.landurbplan.2015.01.003.

Nam, J. and Dempsey, N. (2019) 'Understanding stakeholder perceptions of acceptability and feasibility of formal and informal planting in sheffield's district parks', *Sustainability (Switzerland)*, 11(2). doi:10.3390/su11020360.

Nascimento, S.M.C., Marit Albers, A. and Gegenfurtner, K.R. (2021) 'Naturalness and aesthetics of colors – Preference for color compositions perceived as natural', *Vision Research*, 185(May), pp. 98–110. doi:10.1016/j.visres.2021.03.010.

Nassauer, J.I. (1988) 'The Aesthetics of Horticulture: Neatness as a Form of Care', *Horticultural Science*, 23(6), pp. 973–977.

Nassauer, J.I. (1993) 'Ecological function and the perception of suburban residential landscapes', *Landscape*, pp. 55–60.

Nassauer, J.I. (1995a) 'Culture and changing landscape structure', *Landscape Ecology*, 10(4), pp. 229–237. doi:10.1007/BF00129257.

Nassauer, J.I. (1995b) 'Messy Ecosystems, Orderly Frames', *Landscape Journal*, 14(2), pp. 161–170. doi:10.3368/lj.14.2.161.

Nassauer, J.I. (1997) 'Cultural Sustainability: Aligning Aesthetics and Ecology', *Placing Nature: Culture and Landscape Ecology*, pp. 67–83.

Nassauer, J.I., Wang, Z. and Dayrell, E. (2009) 'What will the neighbors think? Cultural norms and ecological design', *Landscape and Urban Planning*, 92(3–4), pp. 282–292. doi:10.1016/j.landurbplan.2009.05.010.

National Energy Conservation Center (2021) *Nu Li Tui Dong Shi Xian Tan Da Feng Tan Zhong He Mu Biao 努力推动实现碳达峰碳中和目标 [Strive to achieve carbon peak and carbon neutrality goals]*, *National Development and Reform Commission*. Available at: https://www.ndrc.gov.cn/wsdwhfz/202111/t20211111_1303691_ext.html (Accessed: 5 August 2023).

Newman, L. and Dale, A. (2013) 'Celebrating the mundane: Nature and the built environment', *Environmental Values*, 22(3), pp. 401–413. doi:10.3197/096327113X13648087563827.

Nisbet, E.K. and Zelenski, J.M. (2013) 'The NR-6: A new brief measure of nature relatedness', *Frontiers in Psychology*, 4(NOV), pp. 1–11. doi:10.3389/fpsyg.2013.00813.

Nisbet, E.K., Zelenski, J.M. and Murphy, S.A. (2009) 'The Nature Relatedness Scale- Linking Individuals' Connection With Nature to Environmental Concern and Behavior', *Environment and Behavior*, 41(5), pp. 715–740. doi:10.1177/0013916508318748.

Ode, Å., Tveit, M. and Fry, G. (2008) 'Capturing landscape visual character using indicators: Touching base with landscape aesthetic theory', *Landscape Research*, 33(1), pp. 89–117. doi:10.1080/01426390701773854.

Ode Sang, Å. *et al.* (2016) 'The effects of naturalness, gender, and age on how urban green space is perceived and used', *Urban Forestry and Urban Greening*, 18, pp. 268–276. doi:10.1016/j.ufug.2016.06.008.

Ogrin, D. (1988) 'Structural Theory of Urban Landscape. Between Mimetic Naturalism and Cultural Concepts', *Urban Landscape-Theory and Practice.International Symposium, Ljubljana*, 25(27), pp. 85–100.

Özgüner, H. and Kendle, A.D. (2006) 'Public attitudes towards naturalistic versus designed landscapes in the city of Sheffield (UK)', *Landscape and Urban Planning*, 74(2), pp. 139–1573. doi:10.1016/j.landurbplan.2004.10.003.

Özgüner, H., Kendle, A.D. and Bisgrove, R.J. (2007) 'Attitudes of landscape professionals towards naturalistic versus formal urban landscapes in the UK', *Landscape and Urban Planning*, 81(1–2), pp. 34–45. doi:10.1016/j.landurbplan.2006.10.002.

Pajo, J. (2007) 'Discovering Nature: Globalization and Environmental Culture in China and Taiwan', *Comparative Sociology*, 6(4), pp. 514–516. doi:10.1163/156913307x233764.

Pallant, J. (2010) *SPSS survival manual : a step by step guide to data analysis using SPSS*. 4th ed. Maidenhead: McGraw-Hill.

Palmer, J.F. (2004) 'Using spatial metrics to predict scenic perception in a changing landscape: Dennis, Massachusetts', *Landscape and Urban Planning*, 69(2–3), pp. 201–218. doi:10.1016/j.landurbplan.2003.08.010.

Pan, W.潘伟 (2011) *Daoguan yuanlin daojiao tese pingjia he yingzao yanjiu 道观园林道教特色评价和营造研究 [Study on the Taoist characteristics evaluation and construction of Taoist Gardens]*. Shandong Agricultural University.

Pardela, Ł. *et al.* (2022) 'How vegetation impacts preference, mystery and danger in fortifications and parks in urban areas', *Landscape and Urban Planning*, 228(September), pp. 0–2. doi:10.1016/j.landurbplan.2022.104558.

Paton, M.J. (2021) 'Science and Fengshui : The Concept shi 勢, Rationality and Emotion, and the Ritualisation of Knowledge', *Science and Education*, 30(6), pp. 1371–1386. doi:10.1007/s11191-021-00255-6.

Penning-Rowsell, E.C. (1986) 'Themes, specuations and an agenda for landscape research', in *Landscape meanings and values*, pp. 114–128.

Priego, C., Breuste, J.H. and Rojas, J. (2008) 'Perception and value of nature in urban landscapes: A comparative analysis of cities in Germany, Chile and Spain', *Landscape Online*, 7(1), pp. 1–22. doi:10.3097/LO.200807.

Qi, J.J. and Dauvergne, P. (2022) 'China and the global politics of nature-based solutions', *Environmental Science and Policy*, 137(October 2021), pp. 1–11. doi:10.1016/j.envsci.2022.08.008.

Qiu, L., Lindberg, S. and Nielsen, A.B. (2013) 'Is biodiversity attractive?-On-site perception of recreational and biodiversity values in urban green space', *Landscape and Urban Planning*, 119, pp. 136–146. doi:10.1016/j.landurbplan.2013.07.007.

Quan, X.全晓宇 (2021) 'Qianxi zhongguo chuantong yuanlin yishu de wenxue shenmei shuxing — yi 《Hong lou meng》 zhong daguanyuan weili 浅析中国传统园林艺术的文学审美属性—以 《红楼梦》 中大观园为例 [analysis of the literary aesthetic attribute of Chinese traditional garden art -- Taking the Da Guan Garden

in ', *Art education researh*, 18(3), pp. 110–112.

Quaranta, E., Dorati, C. and Pistocchi, A. (2021) 'Water, energy and climate benefits of urban greening throughout Europe under different climatic scenarios', *Scientific Reports*, 11(1), pp. 1–10. doi:10.1038/s41598-021-88141-7.

Ran, R.冉锐 (2020) *Zhuangzi ziran shenmei yanjiu 庄子自然审美研究 [Zhuangzi's Natural Aesthetic Research]*. Yunnan Normal University.

Randrup, T.B. *et al.* (2020) 'Moving beyond the nature-based solutions discourse: introducing nature-based thinking', *Urban Ecosystems* [Preprint]. doi:10.1007/s11252-020-00964-w.

Reese, G., Stahlberg, J. and Menzel, C. (2022) 'Digital shinrin-yoku: do nature experiences in virtual reality reduce stress and increase well-being as strongly as similar experiences in a physical forest?', *Virtual Reality*, 26(3), pp. 1245–1255. doi:10.1007/s10055-022-00631-9.

Ren, J. (2004) *Huan Jing Lun Li De Wen Hua Chan Shi: Zhong Guo Gu Dai Sheng Tai Zhi Hui Tan Kao 环境伦理的文化阐释:中国古代生态智慧探考 [Cultural Interpretation of Environmental Ethics: Exploration of Ecological Wisdom in Ancient China]*.

Ren, Y. (2019) *Feng shui : Changing Rules and Meanings*. The University of Sheffield.

Rhode, C.L.. and Kendle, A.. (1997) 'Nature for people', in *Urban Nature Conservation : Landscape Management in the Urban Countryside*. New york: Taylor & Francis, pp. 319–335.

Richardson, M., Hallam, J. and Lumber, R. (2015) 'One thousand good things in nature: Aspects of nearby nature associated with improved connection to nature', *Environmental Values*, 24(5), pp. 603–619. doi:10.3197/096327115X14384223590131.

Ridder, B. (2007) 'An exploration of the value of naturalness and wild nature', *Journal of Agricultural and Environmental Ethics*, 20(2), pp. 195–213. doi:10.1007/s10806-006-9025-6.

Rishbeth, C. (2001) 'Ethnic Minority Groups and the Design of Public Open Space: An inclusive landscape?', *Landscape Research*, 26(4), pp. 351–366. doi:10.1080/01426390120090148.

Rishbeth, C. (2016) *Landscape experience and migration: superdiversity and the significance of urban public open space*. Available at: https://search.proquest.com/docview/1837034212?accountid=14785%0Ahttp://dd6lh4cz5h.search.serialssolutions.com/directLink?&atitle=Landscape+experience+and+migration%3A+superdiversity+and+the+significance+of+urban+public+open+space&author=Rishbeth%2C+Clare.

Robbins, P. and Birkenholtz, T. (2003) 'Turfgrass revolution: Measuring the expansion of the American lawn',

Land Use Policy, 20(2), pp. 181–194. doi:10.1016/S0264-8377(03)00006-1.

Robinson, J.M. *et al.* (2020) 'Let nature be thy medicine: A socioecological exploration of green prescribing in the UK', *International Journal of Environmental Research and Public Health*, 17(10). doi:10.3390/ijerph17103460.

Robinson, J.M. and Jorgensen, A. (2020) 'Rekindling old friendships in new landscapes: The environment–microbiome–health axis in the realms of landscape research', *People and Nature*, 2(2), pp. 339–349. doi:10.1002/pan3.10082.

Rohde, C.L.E. and Kendle, A.D. (1994) *Human Well-being, Natural Landscapes and Wildlife in Urban Areas: A Review*, *English Nature*. Peterborough.

Sahlin, E. *et al.* (2015) 'Using Nature-Based rehabilitation to restart a stalled process of rehabilitation in individuals with Stress-Related mental illness', *International Journal of Environmental Research and Public Health*, 12(2), pp. 1928–1951. doi:10.3390/ijerph120201928.

Schnitzler, A. (2014) 'Towards a new European wilderness: Embracing unmanaged forest growth and the decolonisation of nature', *Landscape and Urban Planning*, 126, pp. 74–80. doi:10.1016/j.landurbplan.2014.02.011.

Schultz, P.W. (2000) 'Empathizing with nature: The effects of perspective talking on concern for environmental issues', *Journal of Social Issues*, 56(3), pp. 391–406. doi:10.1111/0022-4537.00174.

Schultz, P.W. (2002) 'Inclusion with Nature: The Psychology Of Human-Nature Relations', *Psychology of Sustainable Development*, pp. 61–78. doi:10.1007/978-1-4615-0995-0_4.

Sebba, R. (1991) 'The landscapes of childhood: The Reflection of Childhood's Environment in Adult Memories and in Children's Attitudes', *Environment and Behavior*, pp. 395–422. doi:10.1177/0013916591234001.

Sempik, J., Rickhuss, C. and Beeston, A. (2014) 'The effects of social and therapeutic horticulture on aspects of social behaviour', *British Journal of Occupational Therapy*, 77(6), pp. 313–319. doi:10.4276/030802214X14018723138110.

Silverman, I. and Eals, M. (1996) 'Sex differences in spatial abilities: Evolutionary theory and data', in Barkow, J.H., Cosmides, L., and Tooby, J. (eds) *The adapted mind. Evolutionary Psychology and the Generation of Culture*. New york: Oxford University Press, pp. 533–553.

Simonič, T. (2003) 'Preference and perceived naturalness in visual perception of naturalistic landscapes', *Journal of Biotechnology*, 81(2), pp. 369–387.

Simpson, J. (2018) 'What you lookin' at? Capturing visual engagement with urban street edges towards an

understanding of how to make them more experientially engaging', (September).

Smith, J., Chapman, A. and Eggleton, P. (2006) 'Baseline biodiversity surveys of the soil macrofauna of London's green spaces', *Urban Ecosystems*, 9(4), pp. 337–349. doi:10.1007/s11252-006-0001-8.

Soga, M. and Gaston, K.J. (2016) 'Extinction of experience: The loss of human-nature interactions', *Frontiers in Ecology and the Environment*, 14(2), pp. 94–101. doi:10.1002/fee.1225.

Soulsbury, C.D. and White, P.C.L. (2015) 'Human-wildlife interactions in urban areas: A review of conflicts, benefits and opportunities', *Wildlife Research*, 42(7), pp. 541–553. doi:10.1071/WR14229.

Southon, G.E. *et al.* (2017) 'Biodiverse perennial meadows have aesthetic value and increase residents' perceptions of site quality in urban green-space', *Landscape and Urban Planning*, 158, pp. 105–118. doi:10.1016/j.landurbplan.2016.08.003.

Southon, G.E. *et al.* (2018) 'Perceived species-richness in urban green spaces: Cues, accuracy and well-being impacts', *Landscape and Urban Planning*, 172(January 2017), pp. 1–10. doi:10.1016/j.landurbplan.2017.12.002.

Stanford, H.R. *et al.* (2022) 'A social-ecological framework for identifying and governing informal greenspaces in cities', *Landscape and Urban Planning*, 221(January), p. 104378. doi:10.1016/j.landurbplan.2022.104378.

Stokols, D. and Altman, I. (1991) *Handbook of environmental psychology*. Edited by D. Stokols and I. Altman. Malabar: Krieger Pub. Co.

Strumse, E. (1996) 'Perceptual dimensions in the visual preferences for agrarian landscapes in western norway', *Journal of Environmental Psychology*, 16, pp. 17–31. doi:10.1016/S0272-4944(05)80219-1.

Sun, T. (2013) 'Zhong Guo Gu Dai Sheng Tai Zi Ran Guan Chan Xi 中国古代生态自然观阐析 [An Explanation and Analysis of Ancient Chinese Ecological Views of Nature]', *Journal of Shanxi Normal University 山西师大学报*, 40(2), pp. 41–45. doi:10.16207/j.cnki.1001-5957.2013.02.014.

Sung, C.Y. (2013) 'Mitigating surface urban heat island by a tree protection policy: A case study of The Woodland, Texas, USA', *Urban Forestry and Urban Greening*, 12(4), pp. 474–480. doi:10.1016/j.ufug.2013.05.009.

Survey Office of the National Bureau of Statistics in Beijing (2022) *The per capita disposable income of the city's residents increased by 8.0% in 2021*, *Beijing municipal Bureau of Statistics*. Available at: http://tjj.beijing.gov.cn/tjsj_31433/sjjd_31444/202201/t20220119_2595421.html (Accessed: 15 July 2022).

Tabachnick, B.G., Fidell, L.S. and Ullman, J.B. (2019) *Using multivariate statistics*. Seventh ed. Boston: Pearson.

Tahvanainen, L. *et al.* (2001) 'Forest management and public perceptions - Visual versus verbal information',

Landscape and Urban Planning, 53(1–4), pp. 53–70. doi:10.1016/S0169-2046(00)00137-7.

Tai, L. (2006) *The Cultural and Aesthetic Aspects of Applying Ecological Plantings in Urban Parksin Taipei Taiwan (C5)*.

Taylor, J. (2017) *Barriers to Naturalistic Planting in Inner City Parks*. University of Sheffield.

Tceluiko, D.S. (2019) 'Influence of Shamanism, Taoism, Buddhism and Confucianism on development of traditional Chinese gardens', *IOP Conference Series: Materials Science and Engineering*, 687(5). doi:10.1088/1757-899X/687/5/055041.

Thompson, C.W., Aspinall, P. and Montarzino, A. (2008) 'The Childhood Factor: Adult Visits to Green Places and the Significance of Childhood Experience', *Environment And Behavior*, 40(1), pp. 111–143.

Thompson, S.G. and Barton, M.A. (1994) 'Ecocentric and anthropocentric attitudes toward the environment', *Journal of Environmental Psychology*, 14, pp. 149–157. doi:10.1017/CBO9780511845260.004.

Threlfall, C.G. and Kendal, D. (2018) 'The distinct ecological and social roles that wild spaces play in urban ecosystems', *Urban Forestry and Urban Greening*, 29(May 2017), pp. 348–356. doi:10.1016/j.ufug.2017.05.012.

Todorova, A., Asakawa, S. and Aikoh, T. (2004) 'Preferences for and attitudes towards street flowers and trees in Sapporo, Japan', *Landscape and Urban Planning*, 69(4), pp. 403–416. doi:10.1016/j.landurbplan.2003.11.001.

Tveit, M., Ode, Å. and Fry, G. (2006) 'Key concepts in a framework for analysing visual landscape character', *Landscape Research*, 31(3), pp. 229–255. doi:10.1080/01426390600783269.

Valentine, G. (1989) 'The geography of women' s fear', *Area*, 21(4), pp. 385–390.

VandenBerg, A.E. and Koole, S.L. (2006) 'New wilderness in the Netherlands: An investigation of visual preferences for nature development landscapes', *Landscape and Urban Planning*, 78(4), pp. 362–372. doi:10.1016/j.landurbplan.2005.11.006.

VandenBerg, A.E., Vlek, C.A.J. and Coeterier, J.F. (1998) 'Group differences in the aesthetic evalution of nature development plans: A multilevel approach', *Journal of Environmental Psychology*, 18(2), pp. 141–157. doi:10.1006/jevp.1998.0080.

VandenBerg, A.E. and Winsum-westra, M. van (2010) 'Manicured , romantic , or wild ? The relation between need for structure and preferences for garden styles', *Urban Forestry and Urban Greening*, 9(3), pp. 179–186. doi:10.1016/j.ufug.2010.01.006.

VandenBorn, R.J.G. *et al.* (2001) 'The new biophilia: An exploration of visions of nature in western countries', *Environmental Conservation*, 28(1), pp. 65–75. doi:10.1017/S0376892901000066.

VanDillen, S.M.E. *et al.* (2012) 'Greenspace in urban neighbourhoods and residents' health: Adding quality to quantity', *Journal of Epidemiology and Community Health*, 66(6), pp. 1–5. doi:10.1136/jech.2009.104695.

Van der Vijver, F. and Leung, K. (1997) *Methods and data analysis for cross-cultural research*. Sage Publications.

Wang, F. (2004) *Lun Chanzong yu Jingguan Sheji 论禅宗与景观设计 [Analysis on Zen and Landscape Architecture]*. Beijing Forest University.

Wang, Q.王謇 (2013) *Zhongxi chuantong ziranguan dui xiandai jingguan yuanlin sheji de yiyi 中西传统自然观对现代景观园林设计的意义 [The Significance of Chinese and Western Traditional Views of Nature on the Modern Landscape Design]*. Tianjin University.

Wang, R. *et al.* (2019) 'Characteristics of urban green spaces in relation to aesthetic preference and stress recovery', *Urban Forestry and Urban Greening*, 41(101), pp. 6–13. doi:10.1016/j.ufug.2019.03.005.

Wang, R. and Zhao, J. (2017) 'Demographic groups' differences in visual preference for vegetated landscapes in urban green space', *Sustainable Cities and Society*, 28. doi:10.1016/j.scs.2016.10.010.

Wang, R., Zhao, J. and Liu, Z. (2016) 'Consensus in visual preferences : The effects of aesthetic quality and landscape types', *Urban Forestry & Urban Greening*, 20, pp. 210–217. doi:10.1016/j.ufug.2016.09.005.

Wang, R., Zhao, J. and Meitner, M.J. (2017) 'Urban woodland understory characteristics in relation to aesthetic and recreational preference', *Urban Forestry and Urban Greening*, 24(March), pp. 55–61. doi:10.1016/j.ufug.2017.03.019.

Wang, X.王夏琳 (2021) 'Lun zhongguo chuantong shanshui hua zhong de ziran shenmei yishi 论中国传统山水画中的自然审美意识 [An Analysis of the natural aesthetic consciousness in Chinese traditional landscape painting]', *Masterpiece Appreciation 名作欣赏*, 27, pp. 163–164.

Wang, Y.王艳 (2016) *Rujia'liYue sixiang'' yu jiangnan sijia yuanlin buju de yanjiu 儒家"礼乐思想"与江南私家园林布局的研究 [The study on Confucian thoughts of rites and melody and the layout of Jiangnan private gardens]'*. Northeast Forestry University.

Weigel, R. and Weigel, J. (1978) 'Environmental Concern: The Development of a Measure', *Environment and Behavior*, 10(1), pp. 3–15.

Weissgerber, M., Chanteloup, L. and Bonis, A. (2023) 'Perceptions of vegetation succession following agricultural abandonment in the Massif Central region (France)', *Landscape and Urban Planning*, 234(February), p. 104717. doi:10.1016/j.landurbplan.2023.104717.

Wells, N.M. and Lekies, K.S. (2006) 'Nature and the life course: Pathways from childhood nature experiences to

adult environmentalism', *Children, youth and environments*, 16(1), pp. 1–25.

Wheeler, B.W. *et al.* (2015) 'Beyond greenspace: An ecological study of population general health and indicators of natural environment type and quality', *International Journal of Health Geographics*, 14(1), pp. 1–17. doi:10.1186/s12942-015-0009-5.

White, M.P. *et al.* (2017) 'Natural environments and subjective wellbeing: Different types of exposure are associated with different aspects of wellbeing', *Health and Place*, 45(January), pp. 77–84. doi:10.1016/j.healthplace.2017.03.008.

Wiens, J.A. (1994) 'Using fractal analysis to assess how species perceive landscape structure', *Landscape Ecology*, 9(1), pp. 25–36.

Wood, W. *et al.* (2002) 'A Cross-Cultural Analysis of the Behavior of Women and Men : Implications for the Origins of Sex Differences', *Psychological Bulletin*, 128(5), pp. 699–727. doi:10.1037//0033-2909.128.5.699.

Woudstra, J. (2004) 'The changing nature of ecology: a history of ecological planting(1800-1980)', in *The Dynamic Landscape: Design, Ecology and Management of Naturalistic Urban Planting*. London: Spon Press, pp. 23–57.

Wu, J.吴静子, Wang, Q.王其亨 and Zhao, D.赵大鹏 (2019) 'Jiyu wenzi yu wenxian yanjiu de "shanshui "yuci fengjing shenmei tanyuan 基于文字与文献研究的"山水"语词风景审美探源 [Exploration of Aesthetic Origin of"Shan Shui"Word Based on the Study of Text and Literature]', *Journal of Tianjin University*, 21(5), pp. 446–453.

Xiao, C. and Mccright, A.M. (2015) 'Gender Differences in Environmental Concern : Revisiting the Institutional Trust Hypothesis in the USA', *Environment and Behavior*, 47(1), pp. 17–37. doi:10.1177/0013916513491571.

Xie, J. (2016) 'Urban Planning, Policy and Everyday Use of Green Space: A case study of Huangpu District, Shanghai', (August). Available at: http://etheses.whiterose.ac.uk/13806/.

Xu, H. *et al.* (2013) 'Effective environmental interpretation at Chinese natural attractions: The need for an aesthetic approach', *Journal of Sustainable Tourism*, 21(1), pp. 117–133. doi:10.1080/09669582.2012.681787.

Xu, Y. (2021) 'Tianyuan shi yu zhongguo ziran shenmei sixiang de zijue 田园诗与中国自然审美思想的自觉 [Pastoral poetry and the consciousness of Chinese natural aesthetic thought]', *New documentary 新纪实*, 33, pp. 81–83.

Xu, Z.许智银 (2009) 'Natural Imagery of Farewell Poems in Tang Dynasty 唐代送别诗的自然意象', *Guizhou Social Sciences 贵州社会科学*, 232(4).

Xue, F. (2010) *Chinese City and Urbanism : Evolution and Development*. Singapore: World Scientific.

Xue, F.薛富兴 (2005) 'Wei jin zi ran shen mei gai guan 魏晋自然审美概观 [Overview of natural aesthetics in Wei and Jin Dynasties]', *Journal of Northwest Normal University (Social Science)*, 42(3), pp. 19–25.

Xue, F.薛富兴 (2006) 'Song Dai Zi Ran Shen Mei Shu Lve 宋代自然审美述略 [An outline on the Appreciation of the Nature in Song Dynasty]', *Journal of Guizhou Normal University (Social Science)*, 1.

Yang, F. *et al.* (2019) 'Public perceptions and preferences regarding lawns and their alternatives in China: A case study of Xi'an', *Urban Forestry and Urban Greening*, 46(September). doi:10.1016/j.ufug.2019.126478.

Yang, M. (2015) 'Shamanism and Spirit Possession in Chinese Modernity: Some Preliminary Reflections on a Gendered Religiosity of the Body', *Review of Religion and Chinese Society*, 2(1), pp. 51–86. doi:10.1163/22143955-00201001.

Yang, R.杨锐, Hou, S.侯姝彧 and Cao, Y.曹越 (2021) 'Zhongguo gudai shanshui yingjian zhihui yu shijian 中国古代山水营建智慧与实践 [Shan-shui Landscape Creation in Ancient China: Wisdom and Practice]', *Chinese landscape Architecture 中国园林*, 37(7), pp. 6–12.

Yang, W.杨文阁 (2019) 'Qian Shuo Zhong Guo Shan Shui Shen Mei Yi Shi De Fa Zhan Yuan Yuan He Zhong Guo Shan Shui Hua De Fa Zhan 浅说中国山水审美意识的发展渊源和中国山水画的发展 [A Brief Introduction to the Development of Aesthetic Consciousness in Chinese Landscapes and the Development of Chinese Land', *Art and design 美术与设计*, pp. 175–176.

Yuan, W. (2022) 'Zhong Guo Shan Shui Wen Hua Zai Xian Dai Jing Guan She Ji Zhong De Yun Yong 中国山水文化在现代景观设计中的运用 [The use of Chinese landscape culture in modern landscape design]', *Current Decoration Theory* [Preprint].

Zardo, L. *et al.* (2017) 'Estimating the cooling capacity of green infrastructures to support urban planning', *Ecosystem Services*, 26, pp. 225–235. doi:10.1016/j.ecoser.2017.06.016.

Zhang, G.张广强 (2006) *Zhongguo shanshui huazhong de ren yu ziran 中国山水画中的人与自然 [Man and nature in Chinese landscape painting]*. Zhengzhou University.

Zhang, H. *et al.* (2013) 'Landscape perception and recreation needs in urban green space in Fuyang, Hangzhou, China', *Urban Forestry and Urban Greening*, 12(1), pp. 44–52. doi:10.1016/j.ufug.2012.11.001.

Zhang, J.张俊玲 and Wang, Y.王艳 (2016) 'Ruxue shenmei yishi yu zhongguo gudian yuanlin de jiaorong 儒学审美意识与中国古典园林的交融 [The Blend between Confucianism Aesthetic Consciousness and Chinese Classical Garden]', *Journal of Anhui Agriculture*, 44(6), pp. 1–3. doi:10.13989/j.cnki.0517-6611.2016.06.067.

Zhang, L., Dempsey, N. and Cameron, R. (2023) 'Flowers – Sunshine for the soul! How does floral colour

influence preference, feelings of relaxation and positive up-lift?', *Urban Forestry and Urban Greening*, 79, p. 127795. doi:10.1016/j.ufug.2022.127795.

Zhang, Q.张蔷 *et al.* (2020) 'Baihuashan ziran baohu qu dianxing qunluo jiegou ji wuzhong duoyangxing tezheng 百花山自然保护区典型群落结构及物种多样性特征 [Species diversity and structural characteristics of typical forest communities in the Nature Reserve of Baihua Mountain]', *Journal of Beijing Normal University (Natural Science)*, 56(1), pp. 122–131.

Zhang, W. (2010) *Dangdai jingguan yingjian fangfa de leixingxue yanjiu 当代景观营建方法的类型学研究 [The typology study on approaches of contemporary landscape architecture]*. South China University of Technology.

Zhang, W., Goodale, E. and Chen, J. (2014) 'How contact with nature affects children's biophilia, biophobia and conservation attitude in China', *Biological Conservation*, 177, pp. 109–116. doi:10.1016/j.biocon.2014.06.011.

Zhang, W.张文娟 (2016) *Jianlun zhongguo shiqian shehui ziran shengtai guan 简论中国史前社会自然生态观 [Briefly Discusses about View on Natural Ecology in the Prehistoric Society]*. Tianjin Normal University 天津师范大学.

Zhang, X. *et al.* (2020) 'Public perception and preferences of small urban green infrastructures: A case study in Guangzhou, China', *Urban Forestry and Urban Greening*, 53(January), p. 126700. doi:10.1016/j.ufug.2020.126700.

Zhang, Z.张濯清 (2016) *Shengtai shiye xia de songdai huihua 生态视野下的宋代绘画 [Traditional Painting of Song Dynasty in the ecological field of vision]*. Central China Normal University.

Zhao, J. (2008) *Thirty Years of Landscape Design in China (1949-1979): The Era of Mao Zedong (Part 1)*. University of Sheffield.

Zhao, J. *et al.* (2013) 'Temporal trend of green space coverage in China and its relationship with urbanization over the last two decades', *Science of the Total Environment*, 442(November), pp. 455–465. doi:10.1016/j.scitotenv.2012.10.014.

Zhao, J., Xu, W. and Li, R. (2017) 'Visual preference of trees: The effects of tree attributes and seasons', *Urban Forestry and Urban Greening*, 25(April), pp. 19–25. doi:10.1016/j.ufug.2017.04.015.

Zheng, B., Zhang, Y. and Chen, J. (2011) 'Preference to home landscape: Wildness or neatness?', *Landscape and Urban Planning*, 99(1), pp. 1–8. doi:10.1016/j.landurbplan.2010.08.006.

Zhou, Q.B., Zhang, J. and Edelheim, J.R. (2013) 'Rethinking traditional Chinese culture: A consumer-based model regarding the authenticity of Chinese calligraphic landscape', *Tourism Management*, 36, pp. 99–112.

doi:10.1016/j.tourman.2012.11.008.

Zhou, W.周维权 (2008) *Zhongguo Gudian Yuanlin Shi 中国古典园林史 [History of Chinese Classical Gardens]*. 3rd edn, *Tsinghua University Press*. 3rd edn. Beijing: Tsinghua University Press.

Zhou, Y.周雅 (2014) *Daojia sixiang yu jianzhu huanjing yingzao yanjiu 道家思想与建筑环境营造研究 [The research of Taoism and the built environment]*.

Zoderer, B.M. *et al.* (2020) 'Ordering "wilderness": Variations in public representations of wilderness and their spatial distributions', *Landscape and Urban Planning*, 202(June 2019), p. 103875. doi:10.1016/j.landurbplan.2020.103875.

Zong, F.宗菲 (2013) *Wei Jin Xuan Xue Ying Xiang Xia Chuan Tong Yuan Lin Mei Xue Fan Chou De Gou Jian 魏晋玄学影响下传统园林美学范畴的构建 [The Construction of Aesthetic Categories in Traditional Gardens under the Influence of Wei and Jin Metaphysics]*. Tian Jin University 天津大学.

| Chapter 8 : Appendix

1. English Version of Questionnaire of LLP

The University Of Sheffield.

Public perception of planting survey

Thank you for agreeing to take part in this survey measuring public perception of planting. Today we will be gaining your thoughts and opinions to make better planting design and ecological development in the future. This survey would take approximately 10 minutes to complete. Please answer the questions one by one as the following order. Be assured that this survey is anonymous, all answers you provide will be kept in the strictest confidentiality and destroyed at the end of the research process.

Part 1: General experience of and general attitude to nature

(For each of the following statement please tick one box most relevant to you.)

1.1 My ideal vacation spot would be a remote, wilderness area.

☐Strongly agree ☐Tend to agree ☐neither agree/disagree ☐Tend to disagree ☐Strongly disagree

1.2 I always think about how my actions affect the environment.

☐Strongly agree ☐Tend to agree ☐neither agree/disagree ☐Tend to disagree ☐Strongly disagree

1.3 My connection to nature and the environment is a part of my spirituality.

☐Strongly agree ☐Tend to agree ☐neither agree/disagree ☐Tend to disagree ☐Strongly disagree

1.4 I take notice of wildlife wherever I am.

☐Strongly agree ☐Tend to agree ☐neither agree/disagree ☐Tend to disagree ☐Strongly disagree

1.5 My relationship to nature is an important part of who I am.

☐Strongly agree ☐Tend to agree ☐neither agree/disagree ☐Tend to disagree ☐Strongly disagree

1.6 I feel very connected to all living things and the earth.

☐Strongly agree ☐Tend to agree ☐neither agree/disagree ☐Tend to disagree ☐Strongly disagree

1 / 6

1.7 **Which of the following pictures is most representative of nature to you?** *(please tick one or more)*

☐ 

☐ 

☐ 

☐ 

☐ 

☐ 

1.8 Where do you think your interest in nature comes from? *(Please tick one box for each line only)*

	Item	Most important	More important	Less important	Least important
1	Childhood memories	☐	☐	☐	☐
2	Travel experience	☐	☐	☐	☐
3	Interested in wild plants and animals in nature	☐	☐	☐	☐
4	Influenced by landscape painting	☐	☐	☐	☐
5	Influenced by calligraphy / literature / poem	☐	☐	☐	☐
6	Influenced by Chinese traditional garden	☐	☐	☐	☐
7	Influenced by traditional philosophical thoughts (Daoism, Buddhism, Confucianism, etc.)	☐	☐	☐	☐
8	None of the above, please give details: _____	☐	☐	☐	☐

2 / 6

1.9 What are your main reasons for going to nature? *(please tick one box for each item each column only)*

	Item	Most important	More important	Less important	Least important
1	Nature as a relaxing leisure setting	☐	☐	☐	☐
2	Actively observing nature	☐	☐	☐	☐
3	Walking/running/cycling in nature	☐	☐	☐	☐
4	Working in/around nature/passing by	☐	☐	☐	☐

(For each of the following statement please tick one box most relevant to you.)

1.10 I had many chances to experience nature in my childhood.

☐Strongly agree ☐Tend to agree ☐neither agree/disagree ☐Tend to disagree ☐Strongly disagree

1.11 I like the planting to be geometrically (e.g. straight line, circle or grid) organised rather than random.

☐Strongly agree ☐Tend to agree ☐neither agree/disagree ☐Tend to disagree ☐Strongly disagree

1.12 It is important to have natural vegetation and wildlife (e.g. bees, birds, butterflies etc.) in cities.

☐Strongly agree ☐Tend to agree ☐neither agree/disagree ☐Tend to disagree ☐Strongly disagree

1.13 The more types of species in planting, the more valuable it is as a wildlife habitat.

☐Strongly agree ☐Tend to agree ☐neither agree/disagree ☐Tend to disagree ☐Strongly disagree

1.14 Natural urban woodland can help reduce carbon emissions more than conventional ornamental gardens.

☐Strongly agree ☐Tend to agree ☐neither agree/disagree ☐Tend to disagree ☐Strongly disagree

1.15 It is possible to design and create something approximating to real nature in the city.

☐Strongly agree ☐Tend to agree ☐neither agree/disagree ☐Tend to disagree ☐Strongly disagree

1.16 Human induced climate change is happening.

☐Strongly agree ☐Tend to agree ☐neither agree/disagree ☐Tend to disagree ☐Strongly disagree

1.17 Protecting the environment is as important as economic development.

☐Strongly agree ☐Tend to agree ☐neither agree/disagree ☐Tend to disagree ☐Strongly disagree

Part 2: General experience of and attitude to nature in relation to the plantings in front of you

(For each of the following statement please tick one box most relevant to you.)

2.1 I am familiar with this type of woodland vegetation.

☐Strongly agree ☐Tend to agree ☐neither agree/disagree ☐Tend to disagree ☐Strongly disagree

2.2 I might sometimes feel unsafe in this type of woodland vegetation.

☐Strongly agree ☐Tend to agree ☐neither agree/disagree ☐Tend to disagree ☐Strongly disagree

2.3 I am concerned because I cannot I see through the woodland vegetation.

☐Strongly agree ☐Tend to agree ☐neither agree/disagree ☐Tend to disagree ☐Strongly disagree

2.4 I think this planting fits well with government environmental policies.

☐Strongly agree ☐Tend to agree ☐neither agree/disagree ☐Tend to disagree ☐Strongly disagree

2.5 I would be happy to see more planting like this in urban areas in China.

☐Strongly agree ☐Tend to agree ☐neither agree/disagree ☐Tend to disagree ☐Strongly disagree

2.6 This planting makes me feel more peaceful and relaxed than conventional ornamental planting.

☐Strongly agree ☐Tend to agree ☐neither agree/disagree ☐Tend to disagree ☐Strongly disagree

2.7 This planting costs less money to design, maintain and manage than conventional ornamental planting.

☐Strongly agree ☐Tend to agree ☐neither agree/disagree ☐Tend to disagree ☐Strongly disagree

2.8 There are more species of animals living in this planting than in conventional ornamental planting.

☐Strongly agree ☐Tend to agree ☐neither agree/disagree ☐Tend to disagree ☐Strongly disagree

2.9 Compared to the conventional ornamental planting you have seen, this planting looks more…?

(Please tick one box for each line only)

	Item	Strongly agree	Tend to agree	neither agree/disagree	Tend to disagree	Strongly disagree
1	Natural	☐	☐	☐	☐	☐
2	Colourful	☐	☐	☐	☐	☐
3	Messier	☐	☐	☐	☐	☐
4	Denser	☐	☐	☐	☐	☐
5	Complex	☐	☐	☐	☐	☐
6	Less cared for	☐	☐	☐	☐	☐
7	Designed well	☐	☐	☐	☐	☐
8	Attractive	☐	☐	☐	☐	☐

2.10 On a scale of 1 to 10, how would you rate the overall impression of the planting of this site?

(please tick or circle one box only)

1 2 3 4 5 6 7 8 9 10

(very bad) (very good)

4 / 6

Part 3: Personal information

(Please tick the appropriate box and give further detail when requested.)

3.1 Gender

☐ Male ☐ Female

3.2 What is your Age?

☐ 18-29 ☐ 30-39 ☐ 40-49 ☐ 50-59 ☐ 60-69 ☐ Above 70

3.3 What is your highest educational qualification?

☐ High school or below
☐ Junior college or equivalent degree
☐ Undergraduate
☐ Postgraduate and above

3.4 What is your current employment status?

☐ Full-time employment ☐ Part-time employment ☐ Unemployed
☐ Self-employed ☐ Home-maker ☐ Student ☐ Retired

3.5 Which income group (RMB) do you fall under? (monthly, before tax)

☐ student
☐ Less than 4,000
☐ 4,000 - 8,000
☐ 8,000 - 12,000
☐ 12,000 - 16,000
☐ 16,000 - 20,000
☐ above 20,000

3.6 How would you describe your occupation or study?

☐ Related to biological discipline and natural environment
☐ Related to creative practice and design
☐ Related to engineer and physical science
☐ Related to finance and management
☐ Other

3.7 What is your religion?

☐ No religion ☐ Christian (Catholic, Protestant and any other denominations) ☐ Buddhist
☐ Muslim ☐ Daoist ☐ Confucianist ☐ If other please give details:_____

5 / 6

3.8 Where did you grow up?

☐ First-tier city ☐ Second-tier city ☐ Third- tier city ☐ City fringe ☐ Town / Village ☐ Other

3.9 Where are you living now?

☐ First-tier city ☐ Second-tier city ☐ Third- tier city ☐ City fringe ☐ Town / Village ☐ Other

※ **Interviewee recruitment**

Do you wish to participate in the interview later, which is also a part of the research, to discuss your perception of the planting and its current issues in more detail? It would take about 30 minutes somewhere in Beijing or on the telephone (by WeChat or QQ etc.). The interview is anonymous. Details will not be shared, and records will be destroyed at the end of process. If you agree to participate in the interview, please let me know how to contact you in you preferred ways.

Phone: _____

Email: _____

WeChat: _____

QQ: _____

Thank you for your time!

6 / 6

2. Chinese Version of Questionnaire of LLP

The University Of Sheffield.

北京莲花池公园植物感知喜好问卷调研

感谢您抽空参与到这次的公众对植物的感知与喜好的问卷调查中。今天获得您的想法和意见将对未来的景观设计和生态发展有很大帮助。这次的问卷将会占用您约 10 分钟的时间来完成。请按顺序依次作答。此问卷为匿名回答，且您所提供的所有答案将会被严格保密，并在之后全部销毁。

第一部分: 您的自然体验与对大自然的态度

（请为下列问题1.1--1.6 选择一个合适的答案。）

1.1 我理想的度假地点是一个远离城市喧嚣，自然充满野趣的地区。

☐非常同意 ☐同意 ☐既不反对也不同意 ☐不同意 ☐非常不同意

1.2 我总是会思考我的行为对环境的影响。

☐非常同意 ☐同意 ☐既不反对也不同意 ☐不同意 ☐非常不同意

1.3 我与大自然以及周围环境的联系是我精神世界的一部分。

☐非常同意 ☐同意 ☐既不反对也不同意 ☐不同意 ☐非常不同意

1.4 无论我在哪里，我都会留意到野生动植物。

☐非常同意 ☐同意 ☐既不反对也不同意 ☐不同意 ☐非常不同意

1.5 我与大自然的关系是自我认知的重要组成部分。

☐非常同意 ☐同意 ☐既不反对也不同意 ☐不同意 ☐非常不同意

1.6 我觉得我自己与所有的生物以及地球都是紧密相连的。

☐非常同意 ☐同意 ☐既不反对也不同意 ☐不同意 ☐非常不同意

1 / 5

1.7 您认为下列图片哪些最能代表大自然？ *（请选择一个或多个答案）*

☐ 

☐ 

☐ 

☐ 

☐ 

☐ 

1.8 您认为您对大自然的兴趣源自于哪里？ *（请在每行中选出一个答案）*

	项目	非常重要	重要	不重要	非常不重要
1	儿时在大自然中玩耍的记忆	☐	☐	☐	☐
2	在自然山水中的旅行经历	☐	☐	☐	☐
3	对大自然中的野生动植物感兴趣	☐	☐	☐	☐
4	受到中国的风景绘画的影响	☐	☐	☐	☐
5	受到与自然相关的文学作品和书法作品的影响	☐	☐	☐	☐
6	受到中国古典园林的影响	☐	☐	☐	☐
7	受到中国传统哲学思想的影响（如佛教、道教、儒教等）	☐	☐	☐	☐
8	以上皆不是，请给出具体原因： _____				

2 / 5

1.9 您来到大自然中的主要目的是 …？ *（请在每行中选出一个答案）*

	项目	非常重要	重要	不重要	非常不重要
1	把自然环境当作休闲放松的场所	□	□	□	□
2	为了观察大自然	□	□	□	□
3	在自然中漫步、慢跑、摄影等	□	□	□	□
4	在附近区域生活、工作或路过	□	□	□	□

（请为下列问题选择一个合适的答案。）

1.10 我在童年里有很多机会感受大自然。

□非常同意 □同意 □既不反对也不同意 □不同意 □非常不同意

1.11 我喜欢植物呈几何形排列的种植方式（如直线，曲线或网格等），而不是随机自由排列种植。

□非常同意 □同意 □既不反对也不同意 □不同意 □非常不同意

1.12 城市中有自然植物和野生小动物（如鸟类、昆虫、松鼠等）是很重要的。

□非常同意 □同意 □既不反对也不同意 □不同意 □非常不同意

1.13 在种植中使用的植物种类越多，对野生小动物的栖息地越有益。

□非常同意 □同意 □既不反对也不同意 □不同意 □非常不同意

1.14 自然的城市森林可以更好的帮助缓解碳排放，相比于传统观赏性公园。

□非常同意 □同意 □既不反对也不同意 □不同意 □非常不同意

1.15 人类是可以在城市中创造和设计出接近真实大自然的景观环境的。

□非常同意 □同意 □既不反对也不同意 □不同意 □非常不同意

1.16 由人类引起的气候变化正在发生。

□非常同意 □同意 □既不反对也不同意 □不同意 □非常不同意

1.17 保护环境和发展经济一样重要。

□非常同意 □同意 □既不反对也不同意 □不同意 □非常不同意

第二部分: 您对面前植物相关的自然体验与态度

（请为下列问题选择一个合适的答案。）

2.1 我对这种林地种植形式很熟悉。

□非常同意 □同意 □既不反对也不同意 □不同意 □非常不同意

2.2 独自走在这片林地中，我会感到不安全。

□非常同意 □同意 □既不反对也不同意 □不同意 □非常不同意

2.3 我会因为我的视线被林地里的植物遮挡，无法看穿过去而感到担心。

□非常同意 □同意 □既不反对也不同意 □不同意 □非常不同意

3 / 5

2.4 我认为这种林地种植形式很符合政府的环境政策。

☐非常同意 ☐同意 ☐既不反对也不同意 ☐不同意 ☐非常不同意

2.5 我很乐意在中国其他城市或地区见到更多像这样的林地种植形式。

☐非常同意 ☐同意 ☐既不反对也不同意 ☐不同意 ☐非常不同意

2.6 和其他常见的种植相比，这种种植形式让我感到更平静、更放松。

☐非常同意 ☐同意 ☐既不反对也不同意 ☐不同意 ☐非常不同意

2.7 和其他常见的种植相比，这种种植形式的设计、维护和管理的成本更低。

☐非常同意 ☐同意 ☐既不反对也不同意 ☐不同意 ☐非常不同意

2.8 和其他常见的种植相比，有更多野生小动物（如鸟类、昆虫、松鼠等）可以生活在这里。

☐非常同意 ☐同意 ☐既不反对也不同意 ☐不同意 ☐非常不同意

2.9 和其他常见的种植相比，这种种植形式 …？ *（请在每行中选出一个答案）*

	项目	非常同意	同意	既不反对也不同意	不同意	非常不同意
1	更自然	☐	☐	☐	☐	☐
2	色彩更丰富	☐	☐	☐	☐	☐
3	更杂乱	☐	☐	☐	☐	☐
4	更密集	☐	☐	☐	☐	☐
5	设计更复杂	☐	☐	☐	☐	☐
6	更缺少打理	☐	☐	☐	☐	☐
7	设计更精美	☐	☐	☐	☐	☐
8	更具有吸引力	☐	☐	☐	☐	☐

2.10 若以 1 到 10 分制打分，您对这里的林地种植的整体印象如何？ *（请打钩或圈出一个答案）*

1 2 3 4 5 6 7 8 9 10

（非常糟糕） （非常好）

第三部分:个人基本信息

（请为下列每个问题选择一个合适的答案，如有需要请提供详情。）

3.1 性别

☐ 男性 ☐ 女性

3.2 年龄

☐ 18-29 ☐ 30-39 ☐ 40-49 ☐ 50-59 ☐ 60-69 ☐ 70 岁以上

3.3 您的最高学历是？

☐ 高中及以下 ☐ 大专或同等学历 ☐ 本科 ☐ 研究生及更高学历

4 / 5

3.4 您目前的工作状态是?

☐ 全职工作 ☐ 兼职工作 ☐ 待业 ☐自由职业 ☐全职家庭主妇（夫） ☐ 学生 ☐ 退休

3.5 您的收入大概在哪个区间里？（每月个人税前收入）

☐学生

☐少于 4,000 元

☐ 4,000 - 8,000 元

☐ 8,000 - 12,000 元

☐ 12,000 - 16,000 元

☐ 16,000 - 20,000 元

☐ 20,000 以上

3.6 您的职业或课业与以下哪方面相关?

☐ 与生物、农林或自然环境相关 ☐ 与创造性开发或设计相关

☐ 与工程和物理科学相关 ☐ 与经济、金融或管理相关 ☐ 其他

3.7 您的宗教信仰是?

☐ 无宗教信仰 ☐基督教（天主教、新教等） ☐佛教 ☐ 伊斯兰教 ☐ 道教 ☐ 儒教

☐ 以上皆不是，请给出具体名称:_____

3.8 您在哪里长大?

☐一线城市市区 ☐ 二线城市市区 ☐ 三线城市市区 ☐ 城市郊区 ☐县、乡或农村 ☐ 其他

3.9 您现在居住在哪里?

☐一线城市市区 ☐ 二线城市市区 ☐ 三线城市市区 ☐ 城市郊区 ☐县、乡或农村 ☐ 其他

※ 征集受访者

您是否愿意参加后续的采访？这也是本次研究的一部分，我们将更详细的采访您对植物种植的看法和您认为当前环境景观中所存在的问题等？采访为线上采访（如打电话、微信、QQ 等语音视频）。采访大约需要 20 - 30 分钟。所有采访都是匿名的，谈话的详细信息被严格保密，录音记录也将在研究结束后销毁。您所提供的联系方式也将会被严格保密。如果您同意参加面试，请在下方留下您的联系方式（请填写一个或多个联系方式），我们将稍后与您联系。

手机号码: _____ 邮箱地址: _____

微信号: _____ QQ 号: _____

非常感谢您能抽空参与到此次的调研活动。

5 / 5

3. Questionnaire design for each survey site

	BM Nature reserve	**LLP** City Park	**EXPO** Show garden	**Reason for adding or deleting questions**
General questions about 'nature'				
NR-6	√	√	√	
Picture selection of a representation of nature	√	√	√	
Interests in nature	√	√	√	
Reason for visiting nature	√	√	√	
Type of 'natural area' you prefer to visit			√	'Nature reserve' and 'city park' were the options for this question, thus, it and the follow-up question were deleted from BM and LLP surveys. BM only asked about the frequency of visiting somewhere like BM.
Frequency of visiting BM-like areas / 'natural areas' above	√		√	
General questions about 'individual experience/thoughts'				
Experience nature in childhood	√	√	√	
I prefer geometric planting rather than random		√	√	This question focuses on planting preference, not nature itself.
Important to have natural vegetation and wildlife in cities		√	√	People see BM as a natural environment in the city.
More species more valuable for wildlife habitat	√	√	√	
Woodland can help reduce CO_2 emission		√		WP survey in the LLP focuses on woodland-related questions.
Possible to design 'nature' in the city	√	√		It was one of the interview questions initially in the Expo survey
Human-induced climate change is happening		√	√	It was transformed into BM's interview question
Envir. is as important as Economy		√	√	It was transformed into BM's interview question
Perception of the vegetation in front of participants				
Concerns in nature + possible reasons	√			It is a series of in-real-nature-based questions
Feel concerned because unsighted through veg.		√	√	It was contained by the question above
Familiar with planting		√	√	It is a planting-based question which was deleted for BM
Feel unsafe	√	√	√	
Feel peaceful and relaxed	√	√	√	
Happy to see more plantings like this in cities		√	√	It is a planting-based question which was deleted for BM
This planting fits well with envir. policies		√	√	It is a planting-based question which was deleted for BM
This planting costs less money to maintain		√	√	It is a planting-based question which was deleted for BM
This planting supports more wildlife		√	√	It is a planting-based question which was deleted for BM
More natural	√	√	√	
More colourful	√	√	√	
Messier	√	√	√	
Denser	√	√	√	
More complex	√	√	√	
Less cared for	√	√	√	
More boring	√			Without human designs, do people feel bored in real nature?
More exquisite /fine-designed	√	√	√	
More attractive	√	√	√	
How many plant species are in this planting			√	Expo show gardens were small enough, which can be seen and inferred by glancing at the whole area.
How many wildlife species can live in this planting			√	
What aspects of planting do you like the most			√	These questions were open questions with low answer rates. These were transformed into interview questions in the LLP survey.
What aspects of planting do you dislike the most			√	
Overall impression score	√	√	√	
Personal information				
Gender	√	√	√	
Age	√	√	√	
Education	√	√	√	
Employment status	√	√	√	
Income	√	√	√	
Occupation or study	√	√	√	
Religion	√	√	√	
Place childhood spent in	√	√	√	
Current living place	√	√	√	
Current living city			√	People who visited the BM and LLP mainly live in Beijing's urban or suburban areas.

4. Interview Questions

Interview questions for real nature - Baihua Mountain National Nature Reserve

Theme	Content
What do you like the most and least in Baihua Mountain?	▪ Which place/type do you like the most or least in Baihua Mountain? ▪ Do you like the more random placement of trees in natural areas? ▪ Do you like the diversity and density of vegetation at present? ▪ Do you feel yourself connected to this place? ▪ Were the paths too narrow? Were the plants too close to the path?
In-depth explanation of the questionnaire	▪ Why do you think this vegetation looks more natural/colourful/messier…? What features make you think like this? ▪ Why do you feel concerned about…?
Thoughts and general questions about natural areas	▪ How do you feel about having more natural areas like Baihua Mountain in cities? ▪ Do you think there are more species of animals living here than in conventional ornamental planting in the city?
Attitude to nature	▪ How do you define and describe “real nature”? ▪ Do you think real nature is accessible or isolated? ▪ Which statement do you prefer the most: “nature in city/ city in nature” or “the city is the city, nature is nature, 2 separate environments”? Why? ▪ What kind of relationship between real nature and human beings? ▪ Do you like to see the natural season change in nature? Why?
Personal info	(Only for onsite interview)

Interview questions for urban parks- Lotus Lake Park

Theme	Content
General	▪ Do you often see this kind of planting in your daily life? ▪ What do you like the most/least about the park? Why? ▪ What would improve the woodland park for you?
Related to planting	▪ Do you like the more random/more organized placement of trees in the park? ▪ Do you feel OK about the shrubby/mown grass underplanting in places beneath the trees? ▪ Do you like the herbaceous planting from the trees to the path without trimming? ▪ Do you like the diversity of trees at present? ▪ Was the planting ever too boring/common for you? What features make you think like it?
Related to path	▪ Were the plants too close to the path? ▪ Do you like the clear/vague edge of plants along the path? ▪ Were the paths too narrow? How wide is appropriate for you? Why? ▪ Would you have liked more shade over the paths?
Related to feeling and connection	▪ Do you feel you were in nature even though you were in a city? Why? ▪ Do you feel yourself connected to this place? Why? ▪ Did it ever make you feel unsafe? What are you most afraid of/concerned about? Why?
Explanation on questionnaire (Only for online interviews)	▪ You said you feel natural/colourful/attractive/dense/complex/messy… on your questionnaire, What features make you think like it? And why? ▪ How do you define some words like “messy”, “tidy”, “rich layers”, “rough design” …
Thoughts about woodland in cities	▪ How do you feel about having more nature-like woodland parks in Beijing and other cities? * ▪ In the long term, do you think the establishment of urban woodland is good for urban development? ▪ Would the location of woodland in the city make any difference in your feeling?
Attitude to nature	▪ How do you define and describe “real nature”? ▪ Do you think real nature is accessible or isolated? ▪ Which statement do you prefer the most: “nature in city/ city in nature” or “the city is the city, nature is nature, 2 separate environments”? Why? ▪ What kind of relationship between real nature and human beings? ▪ Do you like to see the natural season change in nature? Why?
Personal info	(Only for onsite interview)

Interview questions for show gardens- EXPO

Theme	Content
General	▪ You said you visit natural area _[frequency]_, and you prefer to visit_[type]_, could you please give me more details about the place you visited ▪ Do you have a chance to visit the park or any other green space in your daily life, according to your_[occupation]_? ▪ You said had many chances to experience nature in your childhood, what was it like? please describe.
Attitude towards nature	▪ You said you _[agreed]_ that human-induced climate change is happening, so does it affect your daily life? Or did you notice any other environmental issues induced by humans? ▪ Can you define and describe "nature"? And how would you feel in the nature? ▪ Do you think human beings are part of nature or above nature? ▪ Do you think nature can be created and designed by human beings? ▪ Does our culture (painting, calligraphy, poem, philosophy) have an impact on what you see the nature? how?
Naturalistic vs monoculture in designed urban plantings	 ▪ Look at the photo on the left, is it what you think about nature? And can you tell me the difference between these 3 photos? ▪ Look at the 2nd and 3rd photos, Which one is most representative of nature to you? and why? ▪ How would you feel if the 2nd in your city and your daily life?
Seasonality	 ▪ Please look at these 2 photos, I took these from the same place but in different seasons. Do you like to see the natural season change in nature? Why? ▪ Plantings that look tidy and good all of the time don't have much seasonal change ▪ Which of these would you prefer in cities? ▪ Would location in the city make any difference? How did you feel about this?

Interview questions for stakeholders' interviews

Theme	Content
Personal attitude to the NSR and the WP in the LLP	▪ Once the construction for the NSR in the Expo in 2019 and the WP in the LLP in 2020 was completed, how did you feel about the planting design of these two places respectively? ▪ After 2 years, what do you think about the planting design of these two places at present? ▪ Do you prefer the more random placement of trees in city parks or the more geometric type? ▪ How do you personally feel about having more diverse plantings in Beijing? What about colleagues that you work with? ▪ Compared with traditional planting design in China (patterned flower bed/ trimmed shrub /tree + lawn), is naturalistic planting design more or less attractive to you? How do you feel your colleagues feel about this? ▪ Do you think what are the strengths and weaknesses of this vegetation in LLP? ▪ Were the paths too narrow? Without fences, were the plants too close to the path? ▪ Do these more natural plantings fit with President Xi's notion of an "ecological civilisation"?
General questions for city park design	▪ How does one balance [immediate high initial impact] with [achieving highly diverse native plant communities that don't transplant well at a large size] ▪ What key aspects of urban park/planting design do you value the most? ▪ What is the "ecological/sustainable forest park" to you? Definition? What does it look like? ▪ What are the short-term and long-term goals for urban forest park design/forest city construction? ▪ What do you think of the landscape preference of Chinese park users? ▪ What kind of park is a successful project for the public/designers or constructors/our environment and wildlife? ▪ Do you think the location and attributes of the site will affect the application of naturalistic planting design? (e.g., a central place in the city, or a solemn place) ▪ What was your role in the Expo and LLP project? What do you think about your role? ▪ Before the construction of the NSR and the WP, have you ever had concerns about these projects? What kind of concerns did you have? ▪ What challenges or difficulties do you think that the naturalistic planting design may have in the future in China? ▪ How to improve the naturalistic planting design to have better development in China?
Future plan for the Chinese landscape development	▪ What is the urban landscape like to be in the future in China (5/10/20 years)? ▪ How will you use your strategy to guide future landscape development?

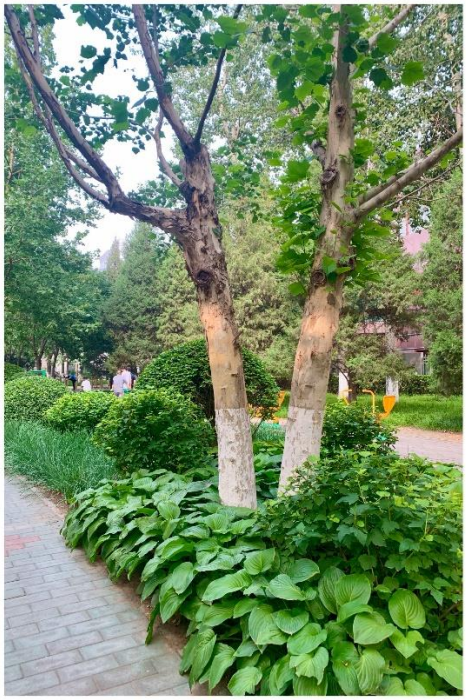
5. Photos of real nature- Baihua Mountain National Nature Reserve




6. Photos of NP in urban park- Woodland Park in Lotus Lake Park




7. Photos of CP in urban park- Traditional Park in Lotus Lake Park



8. Photos of NP in show garden- ‘New Silk Road’ Garden in EXPO

9. Photos of CP in show garden- Beijing Garden in EXPO