The Impact of Environmental Background and Landscape Design on Landscape Preference and Restorative Perception

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Abstract. Research has shown that people prefer natural environments for their restorative effects, while urban landscapes are less favored. However, the relationship between naturalness and landscape preference is not always straightforward, and the impact of human intervention is still a topic of debate. Recent studies have investigated how environmental context and landscape design interact to affect landscape preference and restorative perception. Results suggest that the effects are complex and varied, with naturalistic designs being more effective in enhancing restorative perception in urban and pristine contexts, and artificial designs being more effective in more developed rural environments. Further research is needed to explore regional and cultural differences and design approaches in all six environmental contexts. For optimal results, appropriate landscape design approaches should be adopted in different environmental contexts, with artificial designs being better suited for urban landscapes and natural designs for enhancing restorative perception.

Keywords: Environmental context, Landscape design, Landscape preference, Restorative perception

1   Introduction

Urbanization has become one of the important global trends, with over 50% of the population living in cities. It is expected that urban populations will continue to grow in the coming decades, particularly in developing countries. While urbanization brings benefits such as concentration of production and consumption and increased income for residents, it also brings challenges such as environmental pollution, traffic congestion, scarce resources, population growth, and housing difficulties. It is estimated that by 2030, three out of every five people in the world will be living in urban areas[1]. Prolonged exposure to harsh environments can lead to mental fatigue and reduce people's ability to solve problems[2].

Ozguner and Kendle's (2006) study suggests that people have an appreciative attitude towards both natural and formal landscapes, and believe that each has its own

advantages. In addition, many studies have introduced the concept of "naturalness" as a criterion for classifying nature. The relationship between naturalness and landscape preference is not always linear and is influenced by the type of landscape and location labels.

2   Research on the relationship between landscape design and landscape preference

The term "landscape" originates from the Hebrew text of the Old Testament, describing the overall beauty of the Temple, castle, and palace in the holy city of Jerusalem. Its original meaning is scenery, view, or vista. In the mid-16th century, the realistic landscape painting style emerged in the Netherlands.

The Dutch word "Landschap" evolved from its original meaning of land, countryside, and region to refer specifically to natural landscape paintings.

Landscape design in its modern sense originated in the United States, marked by the establishment of the Landscape Architecture program at Harvard University in 1900. Landscape design began to diverge from landscape painting. After the 1960s, architects, landscape designers, and urban planners gradually realized that large-scale sculptural elements could provide suitable decoration for urban open spaces. Sculptors gained opportunities to showcase their work in public spaces such as parks and plazas, and landscape evolved from natural scenery to artificially constructed sculptures. This evolution has had an impact on landscape design practices in the United States, Europe, and Japan. Landscape has evolved from natural scenery to artificially constructed sculpture forms, which has had an impact. The analysis of the role and value of landscape in enhancing the user experience of public space is discussed.

Landscape preference is the result of a series of interactions between humans and the environment (Li Suxin, 1995). According to Rapoport (1977), the interaction between humans and the environment includes three stages: perception, cognition, and evaluation. Landscape preference is the preferred choice and evaluation of landscape made by individuals or groups based on their psychological expectations, needs, and behavioral habits. It measures the level of preference for a certain landscape environment and reflects the individual's liking for the landscape and their judgment of its beauty in contrast to other landscapes [3-4]. By studying people's landscape preferences for tropical rainforest plants, factors that influence the preferences of respondents can be understood, providing a theoretical basis for building national parks in tropical rainforests and carrying out health tourism and recreational activities in tropical rainforests. The characteristics of landscape are organized and interpreted through individuals' past experiences, knowledge, expectations, and cultural backgrounds, leading to cognitive understanding and value judgments. The third stage involves emotional evaluation of landscape quality based on individuals' past experiences, current needs, expectations, and psychological states, leading to landscape preference. Nassauer (1995) suggested that landscape preference is formed through three processes: perception, cognition, and values. Perception involves immediate understanding of the environment; cognition refers to the way information is organized, stored, and reviewed; and values are enduring

beliefs that conform to society or individual values, and they influence both perception and cognition[5].

Evaluation mechanism for the health benefits of urban park landscapes based on landscape preferences. The study found that urban residents prefer urban park landscapes that have natural, ecological, and cultural characteristics, which help promote the physical and mental health of urban residents[6]. A number of studies have focused on landscape preferences in natural landscapes in the past[7-11].

Participants prefer natural and nature-inspired micro-landscapes, which have better visual and psychological healing effects compared to urban and modernist micro-landscapes. In addition, the application of micro-landscapes can improve indoor space comfort and satisfaction, and reduce anxiety and stress, thus contributing to improving people's quality of life and health.

Measurement methods for landscape preference research. Field survey methods can provide a more realistic and intuitive three-dimensional spatial experience, but may be influenced by on-site environmental factors. The photo evaluation method, although limited by two-dimensional observation, has been shown in many studies to be able to replace real environments. This method can use real photos, simulated images, and completely computer-simulated images as stimuli. The best approach is to combine real photos with computer simulations to increase the authenticity and external validity of the experiment. When choosing which method to use, researchers need to consider factors such as research objectives, time constraints, and practical considerations.

In today's landscape style, form and genre with their unique characteristics, using adjectives to describe garden works cannot objectively differentiate whether they have a positive guiding significance for the development of landscape in our country today.

3   Research Methods

This study focuses on the influence of environmental context and landscape design style on landscape preference and perception of restorativeness. The details are as follows.

Research Framework

The independent variables of this study are environmental background and landscape design methods, while the dependent variables are landscape preference and restorative perception.

Research Hypotheses

Based on the research purpose, framework, and reference literature, the research hypotheses are proposed as follows:

Hypothesis 1 (H1): The interactive effect of environmental background and landscape design method has a significant impact on landscape preference, i.e., the relationship between landscape preference and landscape design method will change due to different environmental backgrounds.

This study used photo assessment method to measure participants' landscape preference and restorative perception. The photos were factorially designed based on two

factors: environmental background and landscape design style. Environmental background was defined based on the classification of recreational settings by WALROS. Considering the feasibility of the operation, this study only used three types of settings: urban, rural development, and natural. Landscape design style was divided into two categories: artificial and natural, and the two factors were cross-combined. See Table 1 for details.

Table 1. Cross tabulation of environmental context and landscape design approach

		Background		
		City	Countryside	Original
Landscape de-sign	Manual	A1	B1	C1
	Nature	A2	B2	C2
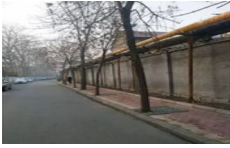
Walros evaluates the level of recreational area development and its essential, social, and management attributes according to the evaluation criteria in Table 2, and categorizes all photos. After the evaluation is completed, one representative photo is selected from each category as the formal photo. The photo representing the urban background should have obvious urban architectural characteristics, while the photo representing the developed rural type should still have significant recreational facilities in a natural rural environment. The photo representing the original background should mainly depict natural landscapes with only a few human-made structures as shown in Table 2. This generates a total of three official pictures Table 3.

Table 2. Description of the degree of development of WALROS leisure sites

Levels	City	Country-side	Rural development	Country-side views	Semi-initial	Ini-tial
Extent	80-100%	50—80%	20-50%	10-20%	3—10%	0-3%
Description of the extent of reclamation	Dominant	Very wide-spread	Common	Occasion-ally		
	Extensive and substantial	Wide-spread	Obvious	Infrequent	Very rare	Very few
	extremely large	Very obvious	Moderate			Hardly any
			Very noticeable			

Source: Haas, Aukerman, Grizzle, & Jackson (2011)

Table 3. Photographs

Envi-ronmen-tal back-ground	City	Rural development	Initial
Number	1	2	3
Photos			

Source: Author's own drawing

The provided photos include two types of landscape design: artificial and natural. However, only one type of design is included in each of the selected photos to ensure that both artificial and natural designs are represented for each environmental background. The photos were modified using Photoshop to better suit the research purpose. The modifications are as follows:

(1) The first photo retained the distant urban background, but the decorations on the wall and roadside were adjusted to create a strong contrast with the vegetation in the foreground.

(2) The second photo retained the main building but replaced the hard revetment with a natural plant revetment and adjusted the clustered buildings to be more in line with nature.

(3) The third photo was chosen as a more artificial design in the original background. In simulating the natural design, natural greenery was added to the open space to reduce the level of human development.

This resulted in the generation of a total of six test pictures Table 4, as shown in the table below:

Table 4. Test Photos

Envi-ronmen-tal back-ground	Landscape design		
		Artificial A1	Natural A2
	City		
	Rural devel-op-ment	B1	B2
	Initial	C1	C2

Source: Author's own drawing

Study Participants:

There are no specific sampling criteria for this study. Anyone with basic reading and communication skills can participate in the study to understand people's landscape preferences and restorative perception for different landscape backgrounds and design approaches.

Data Collection Method:

This study uses "Wenjuanxing" to conduct online surveys. After the questionnaire is completed, it is delivered to the respondents through the sample service provided by the Wenjuanxing website. Respondents can complete the questionnaire online at their own convenience. This service improves the convenience of the operation, ensures the diversity of the sample source, and screens out unqualified questionnaires.

After completing the data collection, the questionnaire survey data is archived on a computer, and the SPSS Statistics 29.0 computer statistical software is used for analysis. The data processing methods are as follows:

This study is mainly divided into four parts:

Descriptive statistics: Using statistical indicators such as frequency distribution, mean, and standard deviation to describe the sample distribution and measurement results.

Reliability analysis: Using Cronbach's α coefficient to evaluate the internal consistency of the questionnaire. An α value between 0.65 and 0.70 is acceptable, an α

coefficient between 0.70 and 0.80 has high reliability, and an α coefficient greater than 0.80 indicates the best reliability.

Variable measurement data processing: The scores of the various characteristics of landscape preference and restorative perception are added up and averaged to calculate the overall score.

Two-factor within-subjects ANOVA: Use the two-factor within-subjects ANOVA to test whether hypothesis one is established.

If the analysis results are significant, it means that different environmental backgrounds and landscape design methods will have a significant difference on the landscape preference and restorative perception of the participants.

4   Results

The conclusion of this study is that the sample population consisted of 61.6% females and 38.4% males, with the majority (48.29%) being between 20-29 years old, followed by 40-49 years old (24.5%) and 30-39 years old (21.6%), while only 1.1% were over 60 years old. In terms of education, the majority (51.0%) had a university degree, followed by postgraduate (28.6%) and vocational school (14.8%) degrees, while only 5.6% had a high school diploma. The majority of the participants lived in cities (78.5%), followed by suburban areas (16.9%), with the smallest proportion living in rural areas (4.5%). The details are presented in Table 5.

Table 5. Description of participant background information

Statistics	Number	Percentage
Gender		
Male	176	38.4
Female	282	61.6
Statistics	458	100
Age		
20-29Year	221	48.2
30-39Year	99	21.6
40-49Year	112	24.5
50-59Year	21	4.6
60Age and above	5	1.1
Statistics	458	100.0
Education level		
High School	25	5.6
Specialized	68	14.8
University	234	51
Postgraduate and above	131	28.6
Living environment	458	100.0
City Centre	346	75.5
Suburban	91	19.9
Rural	21	4.56
Statistics	458	100.0

In urban environments, there is a clear difference in preference for different landscape design approaches. In contrast, landscapes with naturalistic design methods are less popular, while landscapes with artificial design methods are more preferred. In

developed rural environments, there are also significant differences in preferences for different landscape design approaches. Landscapes using artificial design approaches are favored, while landscapes using naturalistic design approaches are less popular. However, in pristine environments, there were no significant differences in preferences for different landscape design approaches, meaning that there was a high degree of similarity in preferences for artificially and naturally designed landscapes.

The main objective of the study was to explore the influence of environmental context and landscape design approach on landscape preferences and restorative perceptions through a cross-section of environmental contexts (urban, rural development, initial) and landscape design approaches (artificial, natural), using computer simulations to generate landscape photographs.

5   Conclusion

In today's diverse societal contexts, people's preferences for landscape design exhibit pronounced differences. For instance, in urban settings, characterized by their unique metropolitan features and pace of life, man-made landscape design techniques tend to be more favored, significantly surpassing natural design approaches. Similarly, even in developed rural areas, there's a notable inclination towards man-made landscape designs over naturalistic ones. However, in pristine environments or those less influenced by human intervention, regardless of the design method, people's preferences appear to be consistent without significant variance. This perhaps signifies that in untouched settings, the distinction between the allure of nature and man-made design blurs, with people leaning more towards harmony and balance. Such insights might suggest a deep-seated human desire to blend innovation with nature, especially when untouched by the overwhelming influence of modernization.

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