


CONSTRUCTION OF EVALUATION INDEX OF NATURE-RELATEDNESS EFFECT OF PUBLIC ART LANDSCAPE UNDER THE BACKGROUND OF SUSTAINABLE DEVELOPMENT OF ENVIRONMENT

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ARTICLE INFO	ABSTRACT
<p>Article history:</p> <p>Received 31 January 2023</p> <p>Accepted 05 April 2023</p>	<p>Purpose: From the two dimensions of aesthetic nature-relatedness and experience nature-relatedness, we systematically construct an evaluation index system of public art nature-relatedness effect composed of the attraction effect index, communication effect index, reflection effect index, and experience effect index. The construction of the evaluation index system has laid a perfect foundation for the nature-relatedness evaluation of public art landscape.</p>
<p>Keywords:</p> <p>Sustainable Development; Regional Environment Index; Public Art Landscape; Nature-relatedness Effect.</p>	<p>Theoretical framework: 'Natural-relatedness' is a kind of relationship, which contains the individual's recognition, praise, tolerance, and understanding of the interconnection between man and nature. The content involved not only includes the individual's feeling of facing nature but also the self-concept contained in nature, as well as the individual's values of nature, self, and society. The natural-relatedness has a positive effect on people's green ecological view and healthy outlook on life.</p>
	<p>Design/methodology/approach: This study used literature analysis, field research, analytic hierarchy process, and case analysis. Through literature analysis, we sort out the current situation and problems in regional environmental planning at home and abroad. The evaluation index system of the natural coupling effect of the public art landscape is constructed by the analytic hierarchy process. The case analysis method is used to analyze the evaluation results.</p>
	<p>Findings: The evaluation index system includes four secondary evaluation indexes: 'the attraction effect, " reflection effect, " communication effect ' and ' the experience effect, 'and 13 tertiary indexes under the secondary indexes. The construction of the evaluation index of the nature-relatedness effect provides a theoretical basis for studying natural public connection in public art landscape design.</p>
	<p>Research, Practical & Social implications: This study combines theory with practice, takes the practical problems encountered in the sustainable development of the regional environment as the starting point, and explores the nature-relatedness mechanism from the public perspective. This research helps to improve the effectiveness of public art landscape design practice and has a significant role in promoting the negative emotions of the public in the city.</p>
	<p>Originality/value: The construction of the evaluation index of the natural connection effect of public art helps to narrow the intimacy and interaction between the public art landscape and the public. The study also provides a specific direction for the creation of the public art landscape.</p>
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CONSTRUÇÃO DO ÍNDICE DE AVALIAÇÃO DO EFEITO DA RELAÇÃO À NATUREZA DA PAISAGEM DE ARTE PÚBLICA SOB O FUNDAMENTO DO DESENVOLVIMENTO SUSTENTÁVEL DO MEIO AMBIENTE

RESUMO

Objetivo: Este estudo adota uma combinação de métodos qualitativos e quantitativos. A partir das duas dimensões de relação com a natureza estética e relação com a natureza da experiência, construímos sistematicamente um sistema de índice de avaliação do efeito de relação com a natureza da arte pública composto pelo índice de efeito de atração, índice de efeito de comunicação, índice de efeito de reflexão e índice de efeito de experiência. A construção do sistema de índice de avaliação estabeleceu uma base perfeita para a avaliação da relação com a natureza da paisagem de arte pública e forneceu um novo método e caminho para o desenvolvimento sustentável do ambiente regional e design de paisagem de arte pública.

Referencial teórico: 'Relacionamento natural' é um tipo de relacionamento, que contém o reconhecimento, o elogio, a tolerância e a compreensão do indivíduo sobre a interconexão entre o homem e a natureza. O conteúdo envolvido não inclui apenas o sentimento individual de enfrentar a natureza, mas também o autoconceito contido na natureza, bem como os valores individuais da natureza, do eu e da sociedade. A relação natural tem um efeito positivo na visão ecológica verde das pessoas e na visão saudável da vida. Com base nessa pesquisa teórica, este estudo explora o mecanismo de naturalidade da arte pública em um ambiente público.

Desenho/metodologia/abordagem: Este estudo utilizou análise de literatura, pesquisa de campo, processo de hierarquia analítica e análise de caso. Através da análise da literatura, classificamos a situação atual e os problemas no planejamento ambiental regional no país e no exterior. O sistema de índice de avaliação do efeito de acoplamento natural da paisagem de arte pública é construído pelo processo de hierarquia analítica. O método de análise de caso é usado para analisar os resultados da avaliação e verificar a viabilidade do índice de avaliação do efeito de relação com a natureza.

Resultados: O sistema de índices de avaliação do efeito de relação com a natureza é baseado no efeito de relação com a natureza e na construção de um ambiente espacial urbano. O sistema de índice de avaliação inclui quatro índices de avaliação secundária: 'o efeito de atração, " efeito de reflexão, " efeito de comunicação ' e 'o efeito de experiência', e 13 índices terciários sob os índices secundários. A construção do índice de avaliação do efeito de relação com a natureza fornece uma base teórica para estudar a conexão pública natural no projeto paisagístico de arte pública. Oferece métodos práticos e caminhos para a criação de paisagens de arte pública no planejamento ambiental regional.

Pesquisa, implicações práticas e sociais: Este estudo combina teoria com prática, toma como ponto de partida os problemas práticos encontrados no desenvolvimento sustentável do ambiente regional e explora o mecanismo de relação com a natureza a partir da perspectiva pública. Esta pesquisa ajuda a melhorar a eficácia da prática do projeto paisagístico de arte pública e tem um papel significativo na promoção das emoções negativas do público na cidade. Ao mesmo tempo, promove o desenvolvimento sustentável do meio ambiente regional.

Originalidade/valor: A construção do índice de avaliação do efeito de conexão natural da arte pública ajuda a estreitar a intimidade e a interação entre a paisagem de arte pública e o público. O estudo também fornece uma direção específica para a criação da paisagem de arte pública. A coexistência harmoniosa da paisagem artística pública e do público contribui para o desenvolvimento sustentável do meio ambiente.

Palavras-chave: Desenvolvimento Sustentável; Índice Ambiental Regional; Paisagem de Arte Pública; Efeito de Relação com a Natureza.

CONSTRUCCIÓN DEL ÍNDICE DE EVALUACIÓN DEL EFECTO DE LA RELACIÓN CON LA NATURALEZA DEL PAISAJE DE ARTE PÚBLICO BAJO EL CONTEXTO DEL DESARROLLO SOSTENIBLE DEL MEDIO AMBIENTE

RESUMEN

Propósito: Este estudio adota una combinación de métodos cualitativos y cuantitativos. A partir de las dos dimensiones de relación con la naturaleza estética y relación con la naturaleza de la experiencia, construimos sistemáticamente un sistema de índice de evaluación del efecto de relación con la naturaleza de la arte pública compuesto por el índice de efecto de atracción, índice de efecto de comunicación, índice de efecto de reflexión e índice de efecto de experiencia. La construcción del sistema de índice de evaluación estableció una base perfecta para la evaluación de la relación con la naturaleza de la paisagem de arte público y proporcionó un nuevo método y camino para el desarrollo sostenible del ambiente regional and design de paisagem de arte público.

Metodología: Este estudio utilizó análisis de literatura, investigación de campo, proceso de jerarquía analítica y análisis de casos. A través del análisis de la literatura, clasificamos la situación actual y los problemas en la planificación ambiental regional en el país y en el extranjero. El sistema de índices de evaluación del efecto de acoplamiento natural del paisaje del arte público se construye mediante el proceso de jerarquía analítica. El método

de análisis de casos se utiliza para analizar los resultados de la evaluación y verificar la viabilidad del índice de evaluación del efecto de relación con la naturaleza.

Conclusiones: Este estudio utilizó análisis de literatura, investigación de campo, proceso de jerarquía analítica y análisis de casos. A través del análisis de la literatura, clasificamos la situación actual y los problemas en la planificación ambiental regional en el país y en el extranjero. El sistema de índices de evaluación del efecto de acoplamiento natural del paisaje del arte público se construye mediante el proceso de jerarquía analítica. El método de análisis de casos se utiliza para analizar los resultados de la evaluación y verificar la viabilidad del índice de evaluación del efecto de relación con la naturaleza.

Implicaciones de la Investigación: Los resultados indican que el número de publicaciones está creciendo, y el área de gestión y negocio es la que más aporta, siendo los países que producen en coautoría también los que más publicaciones aportan.

Palabras clave: Desarrollo Sostenible; Índice Ambiental Regional; Paisaje de Arte Público; Efecto de Relación Con la Naturaleza.

INTRODUCTION

The sustainable development of the regional environment is a highly complex engineering system. Domestic and foreign have made long-term efforts (Agustina, Wijijayanti, Winarno, & Rahayu, 2023). In 1992, the United Nations Conference on Environment and Development adopted the Agenda for Action in the 21st Century with sustainable development as the core. The document is an essential milestone in human environmental protection and sustainable development. In 2000, the United Nations Millennium Summit signed the 'UN Millennium Declaration.' The document has guided the sustainable development of the 21st Century from theory to practice (Zampier, Stefani, & Dias, 2022). In 2015, the UN Sustainable Development Summit adopted 'Transforming Our World: The 2030 Agenda for Sustainable Development'. The conference promoted the sustainable development of cities from three dimensions economy, society, and environment (Rafael & Lopes, 2020). In 2007, the State Council of China issued "Several opinions on promoting the sustainable development of resource-based cities." The document puts forward the guiding ideology to promote the sustainable development of resource-based cities. China has carried out more than 40 practical, sustainable development cases, including ecological civilization construction, low-carbon cities, and sponge cities (X. Wang, Shi, & Zhou, 2020). In 2021, China issued the "China's national plan for implementing the 2030 Agenda for Sustainable Development" and the "China's plan for implementing the 2030 Agenda for Sustainable Development Innovation Demonstration Zone." The scheme clarifies the theoretical research and practical exploration of sustainable urban development.

Public art is an indispensable element in the construction of the regional environment, which plays a positive role in the sustainable development of the environment, the inheritance of regional culture, and the cohesion of the public (Matthews & Gadaloff, 2022). There still

needs to be more research on the direction of public art creation from the perspective of environmentally sustainable development at home and abroad. The purpose of our study on the natural connection mechanism of public art is to improve the nature-relatedness between regional environmental quality and the public. Nature-relatedness refers to the degree to which an individual is emotionally and empirically connected to and belongs to nature. The nature-relatedness has a solid situational nature and will be affected by the individual's experience of contact with nature. The natural connection can promote individual physical and mental health and cognitive function. At the same time, it can also reduce anxiety and upgrade positive emotional experiences. The study found that the more time people stay in nature, the stronger the degree of connection with nature (Grabowska-Chenczke, Wajchman-Świtalska, & Woźniak, 2022). The 'nature' here includes both 'natural' and 'artificial environment.' This study mainly takes the public art in the artificial environment as the research object and takes the evaluation index of the natural connection effect as the research purpose. We use the analytic hierarchy process (AHP) to determine the weight of the nature-relatedness effect index and combine the relevant theories of public art and environmental aesthetics to analyze and evaluate the calculated evaluation value of the public art landscape. We use the combination of theory and practice to assess and analyze the natural connection effect of public art through investigation and analysis of environmental types such as streets and parks.

This study should have the art design perspective and integrate the research foundation of psychology, sociology, and other related disciplines. The public's nature-relatedness process is the relationship between the public's physiology, psychology, and behavior. In addition, public art landscape design is closely related to general behavior and space environment. The public and public art landscapes are two-way influences. Public behavior, thinking, emotion, and cognition can be changed through the public art landscape. The design of the public art landscape is also based on public demand. At present, relevant research still needs to form a systematic idea of urban landscape planning from the perspective of the nature-relatedness of public art. Based on the reality of the incomplete application of quantitative research methods of public art in the urban landscape, this study constructs an evaluation index system of the nature-relatedness effect of public art.

LITERATURE REVIEW

First: Present Situation of Chinese and Foreign Research

The foreign research status

Searching the Web of Science for titles ' Connectedness to Nature ' or ' Inclusion with Nature ' or ' Nature-relatedness ' with ' design, a total of 91 papers were found. From the perspective of research direction, environmental science, ecology, and psychology are the main research directions of related topics. First, most of the art papers related to nature-relatedness are told about 'the environment, " ecology ' and ' psychology. ' Secondly, the theme also involves science and technology, educational science, social science, behavioral science, etc. Based on the research of deep ecology and sustainable development of the environment, this study establishes the nature-relatedness of human beings. We try to infiltrate the spirit of life inspired by public art into the relationship between man and the world and construct the aesthetic realm of poetic dwelling. Based on the intersection of multiple disciplines, this study positions the creative goal of public art as cultivating people's rationality, emotion, and will.

Research state in China

In the CNKI database, the topics of " nature-relatedness, " " natural education, " " natural appreciation " and " natural experience " were searched, and a total of 301 core journals and CSSCI journals were obtained. From the overall research trend, experts ' research on this topic is on the rise as a whole. Chen believed that nature-relatedness is closely related to public environmental awareness(Chen, Gong, & Li, 2022). We should enhance the public 's awareness of environmental protection and awe of nature. At the same time, the public should know how to appreciate the art design in the environment and guide the public to establish pro-environmental behavior. Li believes that the public 's nature-relatedness under urban green space conditions has an impact on individual characteristics, community environment, family impact and other aspects(Li et al., 2022). We should actively improve the built environment, and promote public participation in design, evaluation and other aspects. Wang believes that nature-relatedness should be related to local culture, so we should go deep into the culture and life of the public. Public art creation should be related to the public 's cognitive system(H.-H. Wang, Hong, Lin, & Tsai, 2020). Liu believes that public art not only has the function of nature-relatedness, but also connects the public and public culture, which is the most contemporary cultural spirit in urban landscape(Liu, 2021).

Second: Related Concepts

Sustainable development of regional environment

The sustainable design comes from the concept of sustainable development. The concept of sustainable development was introduced in the 1987 World Commission on Environment and Development report ' Our Common Future '. The report calls sustainable development " a model that meets our current needs without compromising the needs of future generations. (Chan, Suryadipura, & Novel, 2022; Sachs, Kroll, Lafortune, Fuller, & Woelm, 2022)" The Global Sustainable Development Goals (SDGs) for 2016-2030 show that sustainable development will further become a critical purpose and core principle of human development. In essence, sustainable development includes both ecological and human perspectives. The former describes the reproduction and diversity of organisms in the natural environment, while the latter depends on the well-being of human beings brought by the natural world. Under the influence of sustainable development, the urban public domain is considered the root cause of unsustainable problems(Ruggerio, 2021). Jabareen and Breheny believe that the general climate causes environmental issues and plays a crucial role in achieving sustainable development goals.

Public art landscape refers to integrating works of art into public space, making it part of the city or community. It can increase the city's cultural connotation and bring artistic enjoyment and cultural experience to residents and tourists(Motoyama & Hanyu, 2014). The public art landscape includes many different art forms, such as sculpture, murals, installation art, music, performance, etc. These works of art are usually placed in public places such as squares, parks, streets, schools, and public buildings to increase the beauty and appeal of these places. The public art landscape is an indispensable part of regional environmental planning(Wong, 2021). Whether the public art landscape can enable the public to obtain the nature-relatedness is one of the main criteria for evaluating its advantages and disadvantages. It is also the key to the sustainable development of the regional environment.

Dimensions of nature-relatedness effect

The nature-relatedness effect of public art includes life reflection, appeal, and exchange of sympathy in the aesthetic dimension. At the same time, it also consists of the psychological connection and physical connection of the experience dimension(Grabowska-Chenczke et al., 2022). This is a complex process of connecting individuals with the outside world. Based on the aesthetic and experience measurements, this study analyzes the path of the nature-

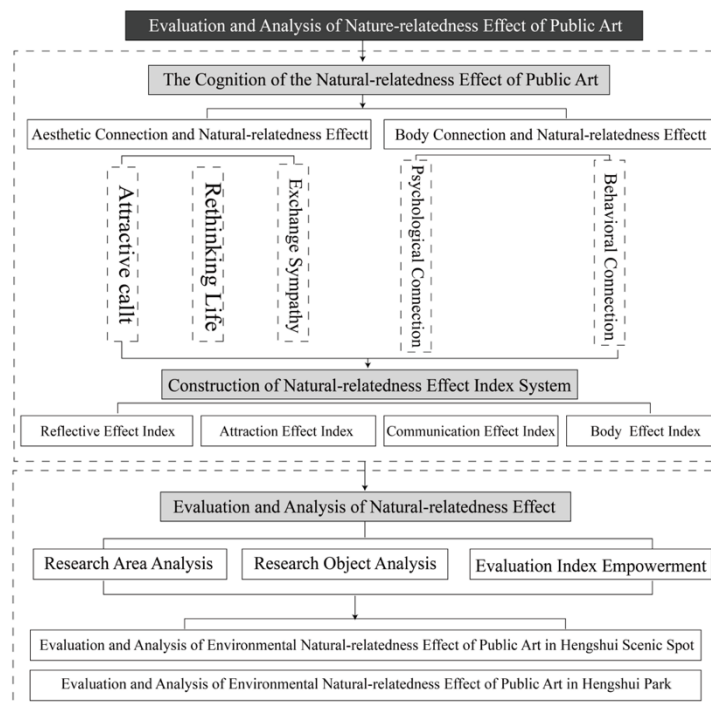
relatedness effect of public art. In the form of frame analysis, this paper examines the psychological journey of the public from emotion, cognition, and experience to nature-relatedness in public space. According to nature-relatedness theory, the nature-relatedness effect of public art is closely related to public art, landscape environment, and public behavior. The nature-relatedness effect is that the public's physical activity promotes cognitive and psychological changes, resulting in the sense of identity and identity with nature (Sadowski, Böke, Mettler, Heath, & Khoury, 2020). According to the aesthetic experience of nature-relatedness theory and the theory of public art creation, the nature-relatedness effect can be divided into the sensory preference layer, communication interaction layer, and reflection sublimation layer.

RESEARCH FRAMEWORK

The primary purpose of this study is to enhance the nature-relatedness of the public in urban public spaces and promote the sustainable development of urban and public art landscapes. In the research, we adopt the combination of theory and practice through the investigation and analysis of the two types of the space environment in parks and scenic spots and evaluate the nature-relatedness effect of public art.

Based on the concept of sustainable development, the dimension, and the level of nature-relatedness effect, this study refines the measurement of nature-relatedness effect from 'aesthetic connection' and 'experience connection.' We first construct the evaluation index system of nature-relatedness effect from four aspects: reflection effect, attraction effect, communication effect, and experience effect. Finally, through field research and regional cultural and cultural analysis, national scenic spots and leisure parks are selected for nature-relatedness effect evaluation and analysis. The analytic hierarchy process (AHP) determines the weight of the nature-relatedness effect index. The public art landscape analysis and evaluation of the calculated evaluation value are combined with the relevant theories of public art and environmental aesthetics, as shown in figure 1.

Figure 1. Study framework



Source: Drawn by the author(2023)

MATERIALS AND METHODS

First: Index Construction Principles

The evaluation index system needs to be constructed with holistic and systematic thinking. Peng Zhanglin believes constructing the evaluation index system should avoid subjectivity and arbitrariness. The construction standard should follow the characteristics of the scientific 'O-C-W-I-S-D' evaluation system: 'C' is completeness, 'W' is Workable, 'I' is independent, 'D' is dynamic, 'S' means significant. It refers to retaining key and contributing indicators. 'D' means dynamic. It refers to the timely adjustment of evaluation indicators with the change of evaluation objectives. We analyze the connotation of the nature-relatedness effect. Based on the characteristics of public art and its spatial environment, we construct an evaluation index system for the nature-relatedness effect of public art: 'the attraction effect, " reflection effect, " communication effect, " experience effect, 'and 13 third-level indicators under the second-level indicators.

Second: Attraction Effect Index

Culturality

The public art landscape is a way of cultural practice and cultural cognitive attitude. Public art and culture are interdependent and mutually nurturing. Since China's urbanization

process has been carried out for nearly 30 years, the remarkable feature of urban construction is the transformation from scale to quality. A city's cultural level and atmosphere are essential for evaluating a city. Regional culture, national culture, popular culture, science and technology culture, art and culture are the most important cultural phenomena in the 21st century, and also the purpose of public art landscape design. Cultural construction issues such as urban humanities and field spirit are becoming increasingly important. Therefore, many projects use the development and construction of public art projects to light up the historical and cultural colors of old industrial areas, urban areas, and communities.

Living

The creative form of public art landscape tends to be more profound 'life', which is easy to understand and meaningful. The public art landscape is an expression close to the heart, which brings a sense of broadening, connection, and belonging to public psychology. As long as the balcony, mask, cooking, humming, cultivation, and other things in daily life can produce a wide range of public cultural effects, it can enhance social 'intimacy.' Public art is open to all citizens. In the field of "dialogue space," "dialogue theme," and "dialogue form," we should use the "life" artistic language to form public cultural value to establish the "intimate relationship" between people and society.

Environmental protection

Publicity is the world outlook and methodology of public art and mapping the relationship between man and nature. People reflect on the relationship between 'man and nature' through public art and then shape the 'world view.' Boyce emphasizes the relationship between nature and man. He is keenly concerned about the public's need for ecology. He regards the connection between land, human beings, animals, and plants as the material of artistic creation. He guides humans to construct a balance between society and the ecological environment. Belgian artist's 'Tower of Biodiversity' project combines art and science to mimic nature. There are concrete seats around the tower, and various animals and plants live in a multi-level space. The work discusses establishing a consensus when facing ecology and different cultural backgrounds. This is a public art and has become an educational place. Teachers and students will regularly visit the works to let children understand the concepts of farming, biodiversity, and ecology and learn how to integrate art and natural science.

Innovation

It is an inescapable social responsibility for public art to complete the 'innovation' guidance in the social division of labor. At the same time, it is also the public's higher requirements for the public environment. The innovation of public art includes improvement, correction, supplement, addition, deletion, growth, negation, transformation and so on.

Third: Attraction Effect Index

Imagination

In public art, landscape creation is influenced by the designer's life experience and artistic accomplishment, and its final effect is also unique. But designers have an everyday appeal, which is to create the image of the work. Whether public artworks are associative is the key to whether the public can obtain a nature-relatedness. In nature-relatedness activities, people must have imaginative thinking to communicate and dialogue with the works. Similarly, the work must also be creative to connect fragmented and isolated knowledge to gain new meaning. The information in the public art landscape can be associated with multiple pieces of information to guide the public from the known field to the unknown area. The process of nature-relatedness is based on the new relationship between the combined data.

Whiteness

The blankness of the public art landscape has two meanings. First, the blankness of the form of the work. Works. It is like an unfinished work with apparent traces to be completed. We regard the behavior and thinking of the public as part of this work. The incompleteness of the results more truly expresses the creator's intention and consciously improves the public's dominant position. Frank Gehry said: If I use the sense of order, integrity, the purpose of the form, and other orthodox aesthetics to understand my works, I will fall into the dilemma of needing to be understood. For example, the overall industrial wind design will have exposed hydropower pipelines or re-collection and display of used objects. Second, the blankness of the content of the work. The form of the work is complete, but the content is vacant. For example, there is a 'telephone booth in the wind' on the open-air hillside of Otomachi, Iwate Prefecture, Japan. But it's a phone booth that needs help to get through. This is to let friends who have lost their loved ones have a place to express their inner feelings.

Simplicity

Designers should be able to keenly recognize the nature of things and choose the primary information for public art creation. The design language should be concise and focused on quickly enabling the public to capture the meaning of the public art landscape. Lao Tzu said: 'One is kind, two is Jane, two do not dare to be the world first.' Here, 'Jane' contains the meaning of 'standing in the perspective of others' to consider the problem. The creation of public art landscape should be simple, and its main purpose is to make it easier for the public to understand the core meaning of the work. The public needs to quickly understand the site's nature and make behavior decisions through space guidance, pavement design, etc. 'Jane' also means 'authenticity.' This requires public artworks to start from the 'heart' and understand life. The public art landscape that allows the public to have a nature-relatedness must strengthen feelings, be true and pure, and resonate with the soul.

Fourth: Communication Effect Indicators

The higher the degree of nature-relatedness of the public, the higher the degree of communication with the public art landscape. The perception, interactivity, and sociability of public art all impact the communication effect, which in turn affects the nature-relatedness of the public.

Perceptuality

The public relies on sensory organs such as eyes and ears to receive information on public art landscapes, and the degree of reception is perception. Environmental information is accurate and rich. When perceiving relevant information, the public has an intuition, an instinct produced by survival adaptation. Perceiving the color, texture, and texture of public art landscape through the five senses is one of the important ways to experience the environment. At the same time, the public will also use their previous knowledge and experience to process information from various senses. From the subjective point of view, the sensory input is organized and reconstructed to obtain new cognition and make action responses.

Interaction

The public interacts with the general art landscape through a series of behaviors, thus forming a different sense of place. Interaction has two meanings: first, the public art landscape interacts with public behavior from content design. For example, the color zebra crossing

created by Bulgarian artist Christo Guelov has changed the habit of pedestrians looking at mobile phones when passing through the zebra crossing and guided public attention to concentrate on walking. Second, the public art landscape interacts with general behavior from digital technology. For example, artists use digital technology to present 'The now' public artwork in New York Times Square that interacts with the gestures and movements of visitors. This work promotes people's understanding of the city and strengthens the interaction between people around them.

Sociality

One of the ways for the public to achieve nature-relatedness is to carry out social activities in a public environment close to people's lives. Therefore, the public art landscape can cross the traffic flow line and provide a more interesting social activity place for the public without hindering people's normal travel activities. Public art based on traffic streamline design is widely needed in municipal engineering projects such as parks and pedestrian streets. These public art landscapes need to understand the behavior characteristics of the public when designing to meet people's social needs such as chatting, walking, sports, and parties. At the same time, designers can also coordinate the relationship with the surrounding environment and traffic flow lines through modeling elements, material texture, color design and other methods, stimulate public communication and social needs, and promote the improvement of nature-relatedness.

Fifth: Experience Effect Indicators

Security

Public art's safety should be put first, the most basic requirement for the public to produce nature-relatedness. The security of site selection, the rationality of volume, the environmental protection and durability of materials, and the reliability of technology are closely related to the safety of public art. For example, the Pompidou Art Center has brought significant security implications to the public due to the exposed waterscape public art of wires, and later reinforced a circle of stainless steel seats to prevent the public from contacting public art.

Interesting

The interest in public art creation is necessary for the public to obtain a nature-relatedness. We need to tap the interest of public art and narrow the distance between the public and works. This allows the public to get a spiritual release from real life. We can also exaggerate the modeling proportion (posture, expression, volume, etc.) of public art and increase the work's interest with the affinity image. At the same time, the designer's personalized design of color, breaking through the traditional bronze color, will reflect the strong style characteristics. In addition, the space environment where public art is located can also use the form of reconstruction to strengthen its sense of space, order, and richness.

Functionality

Designers give public art modeling a specific function but also both formal beauty and artistic originality. This has become one of the more prominent features of public art. Designers combine ergonomics, industrial design, and other related knowledge by adding rest, water, logo, games, lighting, and other functions to public artworks, reflecting the spirit of art serving the public.

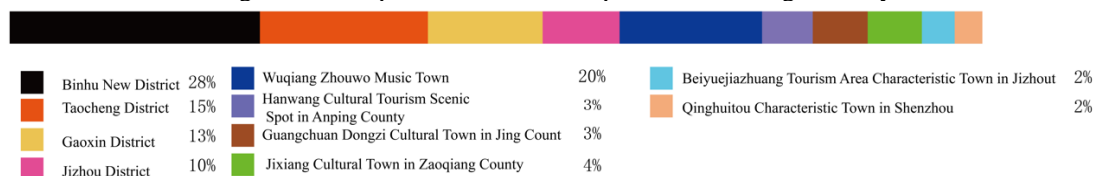
Sixth: Analysis of Research Area

Hengshui City, Hebei Province, has a long history. There is a national 4A-level tourist attraction Hengshui Lake Wetland Nature Reserve, which enjoys the reputation of ' the most beautiful wetland in Beijing, Tianjin and Hebei ' and ' North China Green Pearl. ' In recent years, Hengshui City's " lake city, lake city interaction " as the main line of development, shaping the new momentum of cultural industry development. However, due to the need for more in-depth research on regional culture by creators, public art has fallen into a development model of imitation and application. The research team surveyed six towns in 4 districts of Hengshui from April 2022 to November 2022. The four districts are Taocheng District, High-tech Development Zone, Jizhou District, and Binhu New District. The six towns are Wuqiang Zhouwo Music Town, Anping County Hanwang Cultural Tourism Scenic Area, Jingxian County Guangchuan Dongzi Cultural Town, Zaoqiang County Auspicious Cultural Town, Jizhou Beiyuejiazhuang Tourism Area Characteristic Town, Shenzhou Qinghuitou Characteristic Town. In our research, we recorded 53 public artworks and sorted out the results of public art landscape research in various regions. Finally, this study selects typical projects in representative areas as the main object of this study and makes further analysis.

The Regional Distribution Characteristics Of Public Art In Hengshui City

This study imports the research information on the public art landscape in Hengshui into Excel. Next, we will analyze the spatial area of the public art landscape and select the specific representative public art landscape area. According to the statistical analysis, the regional distribution of public art in Hengshui City is relatively scattered. Among the six towns in the four districts, the number of public art in Binhu New District is the largest, and the number of public art in high-tech development zones is the least. Wuqiang Zhouwo Town has the most significant public art landscapes among the six characteristic towns. Other urban areas show more public art inside the metropolitan area and gradually decrease outside the urban area. The specific research results are as follows: public art in Binhu New District accounts for 28 %, public art in Taocheng District accounts for 15 %, public art in High-tech Zone accounts for 13 %, public art in Jizhou District accounts for 10 %, public art in Wuqiang Zhouwo Music Town accounts for 20 %, public art in Hanwang Cultural Tourism Scenic Area of Anping County accounts for 3 %, public art in Guangchuan Dongzi Cultural Town of Jingxian County accounts for 3 %, public art in the auspicious cultural town of Zaoqiang County accounts for 4 %, public art in Beiyuejiazhuang Tourism Characteristic Town of Jizhou accounts for 2 %, and public art in Qinghuitou Characteristic Town of Shenzhou accounts for 2 %, as shown in figure 2.

Figura 2. The spatial distribution of public art in Hengshui City

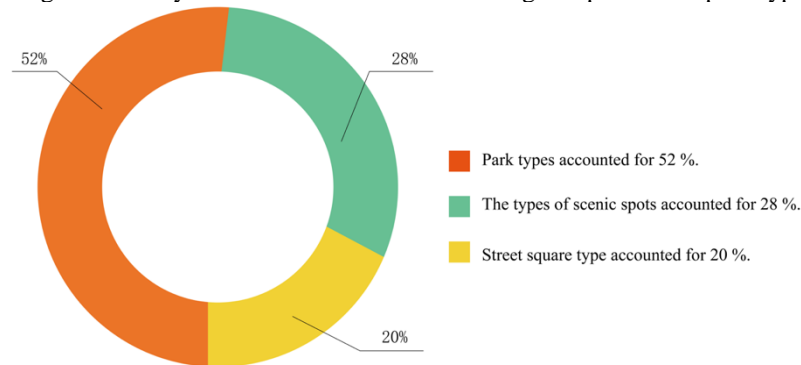


Source: Drawn by the author(2023)

Hengshui City Public Art Space Type Division

The distribution of public art in Hengshui is relatively scattered, but it is mainly concentrated in the following spatial types: scenic spots, parks, street squares, schools, etc. The park type accounts for 52 %, the scenic spot type accounts for 28 %, and the street square accounts for 20 %, as shown in figure 3.

Figura 3. Analysis of the characteristics of Hengshui public art space types



Source: Drawn by the author (2023)

The public art space environment in the four districts of Hengshui City is different. Taocheng District is located in the center of the city. The public art is mainly based on the square street environment, and the surrounding traffic flow is relatively large. The Binhu New District is located on the south side of the main urban area of Hengshui. It is a residential and living area developed recently—for example, Garden Expo Park Scenic Area, Hengshui Lake Scenic Area, etc. The high-tech development zone has a relatively small population, sparse buildings, and public art space types are mainly parks. Jizhou District is an urban area merged from the periphery of Hengshui, involving many villages, and many sites are used for farming.

Seventh: Research Object Selection

This study combines the spatial environment analysis of the public art landscape and selects the public art landscape with substantial influence and strong representativeness as the research object. The Binhu New District, Taocheng District, High-tech Zone, and Wuqiang Zhouwo Music Town in Hengshui City were selected as the research objects. The specific public art landscapes are Taocheng Garden of Garden Expo Park in Binhu New District, the main venue of Garden Expo Park in Binhu New District, Hengshui Lake Sansheng Island in Binhu New District, Hengshui Lake Lotus Garden in Binhu New District, Marathon Square in Binhu New District, Hengshui Lake Wetland Park Science Park Cultural Corridor, Fuyang River Ecological Cultural Park Historical Celebrity, Fuyang River Ecological Cultural Park Celebrity Column, Fuyang River Ecological Cultural Park Longteng Fuyang, High-tech Zone Yishui Park Cultural Wall, High-tech Zone Yishui Park Dongzi Island, Wuqiang Zhouwo Music Town.

Eighth: Evaluation Index Empowerment

This study uses the analytic hierarchy process (AHP) to determine the weight of the nature-relatedness effect index. At the same time, we combine public art, environmental aesthetics, and other related theories to calculate the value of public art landscape analysis and evaluation. The essence of this method is to decompose complex problems into multi-objective and multi-criteria and to empower each objective. We collected and collated the opinions of many experts and determined the criterion layer of the analytic hierarchy process as the attraction effect index, reflection effect index, communication effect index, and experience effect index, and selected 13 index layers from the criterion layer. The experts sorted the natural association effect criterion layer and the index layer, such as table 1, and determined the scale range of each index, such as table 2. In this study, experts were asked to answer questions on the spot and record their scores on various indicators of 12 Hengshui Lake public art landscapes, as shown in table 3.

Tabela 1 Index system of nature-relatedness effect of public art

Target layer	Criterion layer	Index layer
The Nature-relatedness Effect of Public Art	Attraction Effect Index (0.45)	A1 Culture (0.20)
		A2 Living (0.11)
		A3 Environmental Protection (0.08)
		A4 Innovative (0.06)
	Reflective Effect Inde (0.24)	B1 Imagination (0.10)
		B2 Blankness (0.09)
		B3 Simplicity (0.05)
	Communication Effect Index (0.21)	C1 Perception (0.09)
		C2 Interactivity (0.07)
		C3 Sociability (0.05)
	Experience Effect Index (0.10)	D1 Safety (0.04)
		D2 Fun (0.04)
		D3 Functionality (0.02)

Source: Prepared by the author (2023)

Tabela 2 The scale value of the natural coupling effect of each index

Index	Index Scope				
	0-0.2	0.2-0.4	0.4-0.6	0.6-0.8	0.8-1
A1	Very Poor	Relatively Poor	Relatively Good	Good	Very Good
A2	Very Poor	Relatively Poor	Relatively Good	Good	Very Good
A3	Very Poor	Relatively Poor	Relatively Good	Good	Very Good

A4	Very Poor	Relatively Poor	Relatively Good	Good	Very Good
B1	Very Poor	Relatively Poor	Relatively Good	Good	Very Good
B2	Very Weak	Weak	General	Strong	Very Strong
B3	Very Complex	More Complex	Simple	Relatively Simple	Very Simple
C1	Very Poor	Relatively Poor	Relatively Good	Good	Very Good
C2	Very Poor	Relatively Poor	Relatively Good	Good	Very Good
C3	Very Poor	Relatively Poor	Relatively Good	Good	Very Good
D1	Very Poor	Relatively Poor	Relatively Good	Good	Very Good
D2	Very Poor	Relatively Poor	Relatively Good	Good	Very Good
D3	Very Poor	Relatively Poor	Relatively Good	Good	Very Good

Source: Prepared by the author(2023)

Tabela 3 12 public art landscape and space environment scoring

Numbering	Landscape	Index												
		A1	A2	A3	A4	B1	B2	B3	C1	C2	C3	D1	D2	D3
1	Lakeside New District Garden Expo Park Taocheng Park	1	0.9	0.76	0.6	0.78	1	0.7	0.66	0.63	0.87	0.8	0.77	0.85
2	Historical celebrity landscape of Fuyang River Ecological Culture Park in Taocheng District	1	0.4	0.32	0.76	0.82	0.87	0.78	0.45	0.34	0.4	0.9	0.95	0.3
3	Hengshui Wuqiang Zhouwo Music Town	1	0.35	0.6	0.85	0.85	0.84	0.9	0.77	0.44	0.86	0.95	1	0.76
4	Binhu New District Marathon Square	0.54	0.22	0.2	0.32	0.42	0.6	0.44	0.36	0.3	0.58	0.68	0.75	0.26
5	Fuyang River Ecological Culture Celebrity Column in Taocheng District	1	0.76	0.42	0.43	0.82	0.86	0.75	0.82	0.8	0.76	0.87	0.98	0.42
6	High-tech Zone Yishui Park Dongzi Island	1	0.31	0.24	0.44	0.65	0.88	0.48	0.21	0.2	0.42	0.43	0.9	0.47
7	Lakeside New District Garden Expo Park Main Exhibition Hall	0.76	0.84	0.48	0.95	0.73	1	0.3	0.41	0.38	0.69	0.78	0.8	0.21

8	Lakeside New District Hengshui Lake Sansheng Island	1	0.89	0.35	0.65	0.46	1	0.33	0.5	0.48	0.76	0.81	1	0.8
9	Fuyang River Ecological Culture Park ' Longteng Fuyang ' in Taocheng District' ”	1	0.6	0.25	0.57	0.5	0.7	0.45	0.65	0.6	0.25	0.72	0.89	0.1
10	Hengshui Lake Wetland Popular Science Culture Corridor in Binhu New Area	0.2 5	0.47	0.8	0.33	0.32	0.9	0.2	0.33	0.3	0.24	0.24	1	0.2
11	Hengshui lake wetland lotus garden, binhu new district	0.6 9	0.4	0.78	0.54	0.85	0.9	0.45	0.7	0.41	0.37	0.86	1	0.20
12	High-tech Zone Yishui Park Cultural Wall	0.7 6	0.8	0.9	0.82	0.64	1	0.95	0.66	0.5	0.6	0.52	1	0.55

Source: Prepared by the author(2023)

We set A_i ($i = 1, 2, 3, \dots, 13$) as the index set; b_j ($j = 1, 2, \dots, 12$) is a public art landscape dataset. The formula for processing the original data into standardized values is:

$$P_{ij} = W_i \times S_{ij} \quad (1)$$

In the formula, P_{ij} is the standardized value after scoring the public art landscape; w_i is the empowerment of experts on each indicator; s_{ij} rates experts.

The calculation formula of natural coupling effect of public art landscape according to the calculation formula of landscape attraction, the formula is:

$$RA_j = \hat{a}_{i=1}^{13} P_{ij} \quad (2)$$

In the formula, RA_j is the comprehensive effect of the natural connection of public art landscapes; p_{ij} is the standardized value of each index, as shown in table 4.

Tabela 4 12 Scoring and sorting

Number	Attraction Effect	Sort	Reflective Effect	Sort	Communication Effect	Sort	Experience Effect	Sort	Comprehensive Effect	Sort
1	0.3958	1	0.203	2	0.147	2	0.0798	5	0.8256	1
2	0.3152	8	0.1993	4	0.0843	9	0.08	4	0.6788	7
3	0.3375	6	0.2056	1	0.1431	3	0.0932	1	0.7794	3
4	0.1674	12	0.118	12	0.0824	10	0.0624	11	0.4302	11
5	0.343	4	0.1969	5	0.1678	1	0.0824	3	0.7901	2
6	0.2797	9	0.1682	8	0.0539	12	0.0626	10	0.5644	10
7	0.3398	5	0.178	7	0.098	8	0.0674	8	0.6832	6
8	0.3649	2	0.1525	9	0.1166	5	0.0884	2	0.7224	5
9	0.3202	7	0.1355	10	0.113	6	0.0664	9	0.6351	9
10	0.1855	11	0.123	11	0.0627	11	0.0536	12	0.4248	12
11	0.2768	10	0.1885	6	0.1102	7	0.0784	6	0.6539	8
12	0.3612	3	0.2015	3	0.1244	4	0.0718	7	0.7589	4

Source: Prepared by the author(2023)

RESULTS AND DISCUSSION

According to the evaluation results, the ranking of the comprehensive evaluation of the natural coupling effect of public art is as follows : Taocheng Garden of Garden Expo Park in Binhu New District > Celebrity Column of Fuyang River Ecological Cultural Park > Zhouwo Music Town of Hengshui Wuqiang > Cultural Wall of Yishui Park in High-tech Zone > Sansheng Island of Hengshui Lake Wetland in Binhu New District > Main Exhibition Hall of Garden Expo Park in Binhu New District > Historical Celebrities of Fuyang River Ecological

Cultural Park in Taocheng District > Lotus Garden of Hengshui Lake Wetland in Binhu New District > Longteng Fuyang of Fuyang Ecological Cultural Park in Taocheng District > Dongzi Island of Yishui Park in High-tech Zone > Marathon Square of Hengshui Lake Wetland > Cultural Corridor of Popular Science Park in Hengshui Lake Wetland Park.

CONCLUSION

According to the data analysis results, the public art landscapes with higher nature-relatedness effect evaluation have better visual sense and integrity. The following will combine field research and data results to discuss and analyze the top three public art landscapes.

Taocheng Garden ranks first in the comprehensive effect evaluation, and the attraction effect, reflection effect, communication effect and experience effect of public art landscape rank in the top five. From the perspective of attraction effect, the public art culture in Taocheng Garden is strong. Internal painting snuff bottle, court goldfish, waiting shop brush, ancient peach city map and so on are integrated into the creation of public art. As a regional public art landscape, it fully demonstrates the history and culture of Hengshui and conveys it in the form of close to public life (shadow wall, etc.). From the reflection effect, respondents generally reflect that they can feel the profound cultural heritage of Hengshui from the public art landscape of Taocheng Garden. The communication effect mainly depends on the cognitive collision between the interviewee and the regional culture and the explanation of the tour guide. From the perspective of experience effect, Taocheng Garden adopts the traditional courtyard layout structure of 'livable and touristy'. The design fully considers the spatial combination of 'residence' and 'tour', forming an innovative landscape space combining tradition and modernity. Courtyard, backyard, calligraphy and painting experience gallery, Taocheng Square, etc., fully meet the needs of different groups of the elderly, young people and children. The shadow wall wall of the 'ancient peach city good surface map', the peach city map combined with the ground pavement, and the hanging flower door with the 'door god' all bring good regional cultural exchanges to the public.

There are 10 celebrity columns in Fuyang River Ecological and Cultural Park, which are divided into two rows and distributed in sequence on both sides of the celebrity square. The celebrity column does not affect the passage, and the spacing between the columns creates a more hierarchical passage space. In the ranking of 12 nature-relatedness effects of public art, it ranks second. The celebrity column is 13.8 meters high, the column diameter is 1.8 meters, and the base diameter is 2 meters. The celebrity column shows the stories of historical celebrities

such as Confucian master Dong Zhongshu and Tang Dynasty frontier poet Gao Shi in red and white. The picture combines the representative artistic creation techniques of Hengshui area, such as paper-cut, inner painting, New Year painting, knife carving and so on. It has high culture and strong attraction effect. A large number of white space on the celebrity column, line density contrast, line surface combination, simple but artistic, to the public to leave the imagination space, resulting in a higher reflection effect. The space between celebrity pillars creates more interactivity and sociability. Young people, the elderly and children interact with celebrity pillars in their own way. At night, the shining celebrity pillars are dazzling and interesting, showing the spirit of Hengshui as the "hometown of great Confucianism," and the experience effect is good.

The comprehensive effect of nature-relatedness of public art landscape in Wuqiang Zhouwo music town ranks third. Attraction effect, reflective effect, communication effect and experience effect all rank top. There are many public art landscapes in Zhouwo Music Town, which can be divided into architecture, public facilities, wall painting and landscape. Although there are many public art landscapes, the relevant leaders, planners and designers have had a good communication on the planning concept and design theme. The participation of local universities and professional teachers and students at home and abroad has made the public art landscape of Zhouwo Music Town present a unified and harmonious visual style, which has a good attraction effect on the public. From 2016 to 2018, it attracted nearly 600,000 tourists in three years. Zhouwo music town has successfully held many public art festivals, rural music festivals and so on. Tourists, villagers and music lovers from all over the country come together, and the public art landscape has a good communication effect. In-depth Zhouwo music town, in the face of the opportunities and challenges of China's urban development, as well as the thinking of various topics of 'local and global', 'traditional and modern', public art landscape will provide us with a unique perspective of thinking. The combination of public facilities such as walls, street lamps, seats and public art, that is, functional and interesting, has brought a good experience effect to the public.

The nature-relatedness mechanism of public art can improve the public's sense of acceptance, love and immersion in public art landscape. Enhancing the nature-relatedness of the public can release the negative emotions of the public and has positive significance for the sustainable development of cities and human beings. The attraction effect index in the nature-relatedness effect is the key to the evaluation index. Because the culture of attraction effect is the highest score index, the design of public art landscape in regional environment should pay

attention to the integration of local culture. The nature-relatedness effect of public art is closely related to the public environment. Public art landscape should be organized harmoniously with regional culture, space size and environmental elements. Public art works that can stimulate public activities and exchanges can obtain nature-relatedness. The construction of the evaluation index of nature-relatedness of public art will promote the sustainable development of regional environment and the practical path of public art landscape. The evaluation index of the natural connection effect of public art only combines some regions of Hebei Province for verification, which has certain limitations. In the future, it is necessary to examine the feasibility of the evaluation index of the natural connection effect of public art in a broader range. This study verifies the evaluation index based on the research on the public art landscape in Hengshui City, Hebei Province, which has certain limitations. The evaluation indicators will be verified and improved based on a broader range of samples.

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