Research on Landscape Design of Waterfront Public Space in Mountainous Cities Based on User Experience — Taking the Waterfront Landscape Design of Art Peninsula in Chongqing as an Example

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Abstract: Mountainous cities are dominated by mountainous, hilly, and steep terrain, which brings certain complexity and particularity to the planning and construction of waterfront spaces in these cities compared to plain cities. Waterfront spaces, often serving as the core areas of city development, possess favorable location advantages and special attributes of water-land intersection, giving them more possibilities for functional transformation [1]. However, the ultimate goal of design is to provide users with a vibrant waterfront area. The design of waterfront spaces should focus more on people's behavioral needs, allowing users to feel a good interaction between the place and their behavioral needs during space usage [2]. Therefore, the design incorporates human environmental behavior, increases interactive experiences, and enriches spatial interest.

Keywords: User experience; Interaction; Waterfront landscape design

1. Introduction

The concept of user experience was introduced to China around the year 2000 and gradually developed in 2008. In recent years, due to the rapid development of the Chinese market and the rapid growth of mobile internet, user experience has penetrated into people's daily lives, especially in network products. When focusing on the research of landscape facilities, public spaces, and landscape environmental experience design, user experience is mainly manifested in experiential design in landscape design.

2. Interactive experience between humans and space

The transportation hub pocket park at the intersection of Hanjiang North Road and Xinhua Road in Wuhan

creates various spaces with different functional categories to facilitate social activities between individuals and teams, promote interactive experiences between people, plants, and objects, and enhance people's experience. Designers adopt visual experience design and behavioral experience design to promote sensory and behavioral experiences among people. The space is divided into three parts, distinguished by step heights, creating a stepped space that forms a progressive feeling and stimulates people's curiosity to explore [3]. The use of circular seating provides a sense of privacy, creating a relatively quiet resting space that can accommodate people's long-term stays. The park's lighting system reduces energy consumption and improves the pedestrian experience through light-sensing and pedestrian-sensing street lights. Regular horticultural activities are held in the park, which not only increase participation but also allow people to learn about horticultural appreciation and professional knowledge. People can prune flowers and trees, plant flowers and water, and fertilize them according to their preferences, turning them into artworks and stimulating their creative passion. When touching plants and flowers, people can get the most direct sensations, as different plants have varying textures and smoothness, providing diverse stimuli to humans (**Figure 1**).

Figure 1. Wuhan Pocket Park

3. Interactive experience between people and facilities

In 2013, Italian designer Dario Pompei completed the Italian Interactive Forest project in degli Angeli Square. In this landscape, when visitors walk through the interactive forest composed of more than 100 synthetic Information Technology (IT) trees. Each IT tree is equipped with an ultrasonic proximity sensor to detect changes in human position. These sensors transmit information to the control center of the lighting system through an open-source microprocessor, where a computer controls the brightness of the lights [4]. Whenever a visitor passes by, it triggers the IT trees to illuminate the path, and the more active the visitors are, the stronger the IT trees' response [5]. The area has become a prominent space due to the Italian Interactive Forest, which responds to the movement of people passing through. The designer indicates that such an experience can evoke

locals' association with participating in the protection of the local Lake Vico (**Figure 2**) [6].

Figure 2. Glowing IT trees

4. Interactive experience between people and themed areas

The Marina Bay Sands in Singapore is a masterfully designed project by the world-renowned architect Moshe Safdie. Covering a vast area of 101 hectares, it has become one of the largest city gardens in the world. Upon entering Marina Bay Sands, visitors are immediately captivated by the diverse plants and flowers. Here, rare species from around the globe are displayed in their most pristine and beautiful forms, thanks to the ingenious arrangements of the designers. Wandering through the garden feels like being immersed in a colorful natural world, providing a sense of tranquility and relaxation. Moreover, Marina Bay Sands seamlessly integrates multiple themed areas such as the mysterious Cloud Forest, the enchanting Flower Dome, and the majestic Super Trees. Each area offers unique landscape designs and interactive experiences, allowing visitors to appreciate the beauty while also experiencing the charm of different regions (**Figure 3**) [7].

Figure 3. Marina Bay Sands Garden Park, Singapore

5. Analysis of the waterfront landscape design proposal for the Art Peninsula in Chongqing

During the design process, by studying the concept of "user experience" and applying interdisciplinary approaches such as interactive experience, environmental psychology, and landscape design, we aimed to address the existing issues of the Art Peninsula's public space, which included a lack of interaction and a monotonous landscape hierarchy. We focused on human perception and experience within the landscape environment, improving the environment and promoting interaction between "people and people, people and the landscape." This was done to foster advanced emotional interactions, strengthen people's sense of identity with the public space, and increase the enjoyment of visiting.

5.1. Children's play area

In planning the children's play area, we deeply understood children's pursuit of fun and incorporated this philosophy into every aspect of the design. Our goal was to create a comprehensive and enjoyable space that children would find irresistible. In selecting play facilities, we introduced a variety of innovative and interactive play equipment. Beyond traditional slides, swings, and climbing frames, we added creative elements like sand pits and painting walls. These brightly colored and variously shaped facilities not only stimulated children's curiosity and desire to explore but also encouraged physical activity.

The layout of the play area emphasized creating rich and diverse spatial experiences. By installing play facilities at different heights, winding paths, and hidden play spaces, we encouraged children to discover new joys through exploration. This design not only exercised children's bodies and minds but also nurtured their imagination and creativity.

Within the play area, we set up multiple interaction points, such as parent-child interaction zones, allowing children to engage with their parents or other children while playing and enhancing their emotional bonds. Additionally, we could regularly host various themed events like parent-child sports days and children's festival celebrations, providing children with more diversified entertainment experiences.

The sandpit area was the highlight of the design. Here, children could freely dig and build with sand, experiencing its flow and transformation. This natural and intimate play method not only allowed children to unleash their innate playfulness but also fostered their love for and curiosity about nature (**Figure 4**).

Figure 4. Children's Dream World

5.2. Music Plaza

In the center of the plaza, a set of interactive dry fountains are designed. The fountains dance along with people's steps. The faster the steps, the higher the water splashes off the fountains, as if playing a moving piece of music. The pleasant sound of water is like the whispering of a natural stream in your ear, bringing a unique sensory feast to every visitor (**Figure 5**).

Figure 5. Music Plaza

5.3. Land Skateboarding Area

In planning the Land Skateboarding Area, emphasis was placed on enhancing the sports experience and creating a challenging yet smooth space for skateboarding and cycling enthusiasts. The area is equipped with diverse facilities to cater to different skill levels, ensuring that every participant can find suitable challenges and enjoyment. The design pays special attention to the harmonious integration of sports elements with the natural environment. Through clever use of terrain and careful selection of vegetation, the Land Skateboarding Area forms a natural connection with surrounding public spaces, creating a vibrant and harmonious environment for sports enthusiasts. This design not only reduces interference for sports enthusiasts but also allows other visitors to feel the vitality of this area.

Safety and accessibility were paramount in the planning process. The ground is covered with anti-slip materials, effectively reducing the risk of falls during sports activities and ensuring people's safety. Additionally, rest areas and viewing areas are provided for sports enthusiasts to take breaks and enjoy natural scenery. Beyond meeting the functional needs of sports, the design of the Land Skateboarding Area fully considers the possibilities of social and cultural exchange. This area will become a link that promotes vitality in public spaces and enhances interaction among people from different backgrounds and interests, allowing them to share the joy of sports together (**Figure 6**).
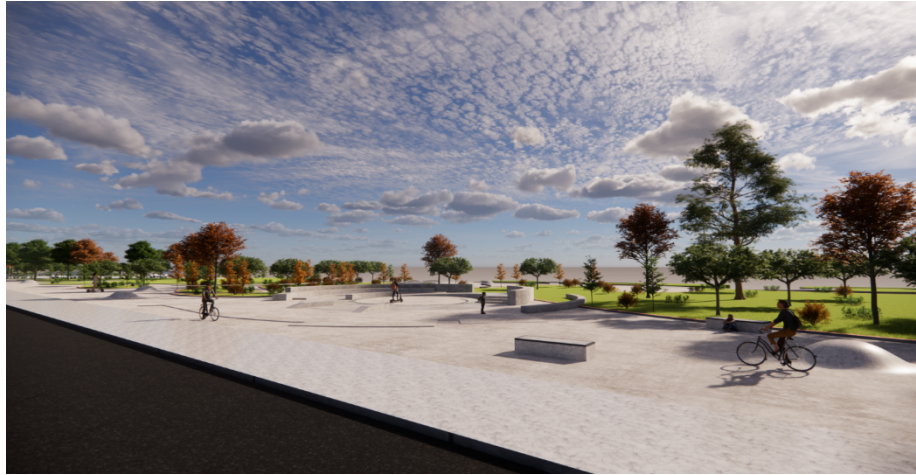
Figure 6. Land Skateboarding Area

6. Summary

In summary, this project represents a comprehensive and in-depth design attempt for the public space of Chongqing Art Peninsula. Through innovative design techniques and a user-centered philosophy, we aim to create a public space that embodies both artistic beauty and humanistic care. This space is envisioned as a venue for cultural experiences and artistic enjoyment, where people can find pleasure and enjoy the good life.

By promoting "human-landscape interaction," we seek to transform the public space of Chongqing Art Peninsula into a culturally and socially interactive public arena. This not only pursues the harmonious coexistence with nature but also deeply explores the fun in life. It encourages people to discover the beauty of life and enjoy every moment full of interest through interactions with nature. Along the pathway, various interactive installations are set up to guide the surrounding population through water elements and nature, emphasizing the interactive experience between "people and people, people and nature" from multiple perspectives such as visual, tactile, and auditory senses. Interactive landscapes such as waterfront platforms and smart interactive facilities are established to encourage citizens to explore and participate, thereby stimulating community vitality. Through the language of landscape design, we integrate natural ecological elements and the city's vitality into citizens' daily lives, creating a modern and cozy leisure place. Additionally, modern technology is incorporated into the design, utilizing smart navigation and environmental monitoring systems to enhance the space's intelligence level and provide convenient information services to citizens.

Disclosure statement

The authors declare no conflict of interest.

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