# Research and practice of restorative landscape design under the direction of healthy city

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**Abstract.** Because of its capacity to assist with individual physical and mental health, the restorative landscape design falling under the direction of healthy city is drawing more and more attention from a variety of businesses. One of the key concerns in landscape architecture research is how to handle with the interaction between restoration landscape, physical space environment, and behavioral space environment. The existing urban public space is increasingly inadequate to fulfill people's diverse health demands. This essay examines the significance and objectives of contemporary revitalizing landscape design against the context of the expansion of healthy cities and the transformation of landscape design. It then suggests a revitalizing landscape design strategy with a healthy city orientation by combining the real-world example of Shanghai Wulong Commercial Plaza waterfront green space design.

## 1 Research background

Cities, which serve as the main channel for human beings, are unexpectedly susceptible to several public health incidents. As the public space in cities continues to grow inadequate to satisfy the different health demands of individuals, the prospect of "healthy cities" is attracting more and more attention from all walks of life. The practice of landscape design has been evolving and expanding throughout the stage of rapid urban development in order to effectively mitigate the environmental harm caused by rapid urbanization and to restore urban space and human physical and mental health. Restorative landscape design with the orientation of healthy city has now emerged. One of the primary areas of professional research in landscape design is how to cope with the interaction between the complex restorative landscape, the physical space environment, and the behavioral space environment.

### 1.1 Connotations of Restorative Landscape Design

A restorative landscape is a landscape establishing that replenishes and renews people's continuously depleted physical and mental resources and capacities, resulting in improvements in directed attention task performance, decreases in levels of voluntary arousal, and other discernible behavioral changes[1]. Environments which possess these functions, but beyond them, are referred to as restorative landscape environments. Restorative landscapes offer an opportunity for mental calming and emotional sharing, encouraging individuals to reduce stress, improve their physical health, nurture their emotions, and find happiness in life. A healing landscape has a more favorable, long-lasting, and beneficial healing impact that promotes individual senses of happiness[2].

### 1.2 Principles of Restorative Landscape Design

(1) Principle of richness:

The creation of a complex therapeutic landscape should adhere to the principle of richness as much as possible, since this will enable individuals to develop a variety of emotions and imaginative states through the landscape and subsequently assist them relax.

(2) Principle of compatibility

The restorative landscape environment and human activity ought to coordinate as seamlessly as possible, enabling individual interests and hobbies while being able integrate in with the surrounding environment[3].

(3) Principle of attractiveness

In order to subtly refresh the body and mind, the reviving landscape setting and design components should be beautiful without capturing too much of the purposeful focus of visitors[4].

## 2 Restorative landscape design strategy under the orientation of healthy city

Implementing a healthy city-oriented restorative landscape takes into account both the physical environment space and usage behavior space, as well as associated design aspects, and continues the design phases of enticing, encouraging, and healing step by step. The specific design strategy is shown in Figure 1.

Attraction in step one: By establishing a rehabilitative landscape surroundings, the fundamental

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requirements of people to experience nature up close while discovering about the humanities and history of the terrain are met.

Encouragement in step two: Provide a variety of functional areas; construct semi-private or private spaces; construct sports spaces and develop multifaceted rehabilitation landscapes[5]; and construct an intelligent, interconnected public facility system. Encourage movement among individuals while they are in the terrain.

Restoration in step three: 1. Utilizing the anti-epidemic design idea to increase the landscape environment's elasticity and resilience and promote the rehabilitation and rejuvenation of tiny and micro places; 2. Developing landscape garden shapes for meditation, interaction, activities, and enjoyment to promote physical and mental well-being; 3. Employing color, water features, soft flora, and urban furniture in the design of the landscape to enhance the therapeutic effects; 4. To encourage the equitable allocation of landscape resources, time-sharing and staggered application of landscape area are recommended[6].

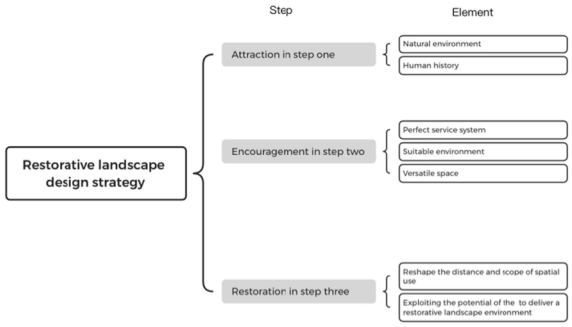


**Fig. 1.** Design strategy for restorative landscape

## 3 Restorative landscape design practice under healthy city orientation

### 3.1 Overview of the Design Base

The design basis, a waterfront green landscape with a north-south orientation that spans roughly 27,000 square meters, is positioned on the south side of Wulong Commercial Plaza in the heart of Shanghai's Songjiang District. Around the site, adjacent to Wulong business Plaza and Songjiang Wanda Plaza, there are several crowded residential neighborhoods and business plazas. The neighboring river's water quality is poor, and it originally served as an old canal. The land surrounding the site is primarily rendered up of natural grass and roads, the most of which have been deserted for a very long time. The design will eliminate two high-voltage towers that are in the base.

### 3.2 Analysis of the program design

This project examines the deeper significance and design principles of contemporary rehabilitative landscape design from the transformation and development of landscape design, with the construction of a healthy city as its backdrop. A approach of restorative landscape design is also suggested under the direction of healthy city, paired with the real-world example of waterfront green space design of Shanghai Wulong Commercial Plaza, which has been employed to design Shanghai Wulong Commercial Plaza's waterfront green space in order to give visitors a revitalizing, "green, safe, and healthy" waterfront green space.

There are two entrances leading to the project's base, one of which is the primary entrance and is connected to the main road of the Wulong Plaza shopping mall, and the other of which is on the site's easternmost side. Two more entrances have been constructed up in the nearby parking lot to address the issue of pedestrian flow, allowing guests to access the building without having to circle around after parking. The original base site is relatively flat, so in order to achieve diversified forms of landscape design, a sense of hierarchy is added to the exterior design by elevating a red corridor to connect the entire site to form a two-level three-dimensional space. A beneath waterfront walkway is established up in the waterfront area as the negative level of the site to increase the richness of the space in the two-dimensional interface. The territory is divided into three principal areas by the zoning section, with a restorative garden and children's playground on the east side and a circular sunken plaza serving as the primary open center plaza next to the main entrance,As shown in Figure 2.

The arc form elements penetrates the design. The establishment of a green belt no-entry zone, no-entry zone set shrubs and plants densely planted to prevent visitors from entering, to minimize the intensity of human exposure to electromagnetic fields, to prohibit visitors from climbing the tower, while the corona discharge on the tower caused by noise to play a certain isolation. Along the shoreline, three distinct types of pathways have been formed, with conserved wood serving as their primary construction element. Tourists may stroll along a waterfront walkway, unwind on waterfront steps, and stroll along a waterfront promenade in the heart of the waterfront area.

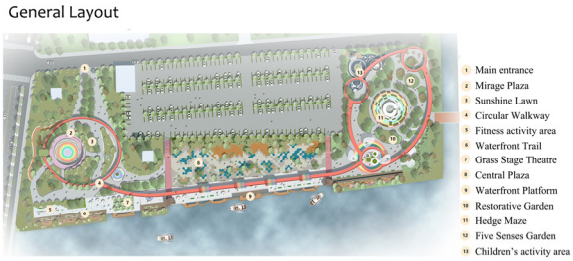


**Fig. 2.** General layout

### 3.3 Spatial composition analysis

In contrast to compound healing waterfront landscape settings, which must take into awareness various spatial compositions, most urban waterfront landscapes are open public spaces that offer areas for leisure and enjoyment. Controlling people's social distance is achieved through the layout of landscape space[7]. According to American researcher Newman, landscape

spaces are composed of "public-semi-isolated-private" layers[8], which are mirrored in the following design:

(1) Public space

The public space in this design is the area that accepts the greatest number of people and remains the site for all visitors. It is distinguished by easy access and a general lack of designated entrances and exits, which can be accessed whenever necessary. The middle area square serves as this design's public space.

(2) Semi-isolated space

With the divider and the limiting of vegetation, the public area creates a semi-isolated environment. As a result of the design's extensive use of semi-isolated spaces and the public character of the site, visitors may have access to more private resting areas while enjoying the environment. The performance in the landscape design is a tiny place under the forest, and the semi-isolated spaces in this design are generally smaller resting spots.

(3) Private space

The majority of the private areas belongs to service spaces, such gas stations, security booths at entrances and exits, and the site's public restrooms, which often serve tourists[9]. Visitors may readily convert the semi-isolated space in this design into a private room, preserving their privacy while serving as a free space separation.

### 3.4 Vertical analysis

The facade of this design employs a multi-level design technique. Tourists can access the second story by walking around a circular walkway that has been built over the sunken plaza in the center. The second floor corridor's layout not only highlights the wide range of facade forms but also assists in separating the population to prevent overcrowding. To create a cohesive and fluid landscape installation corridor, a similar design concept was employed for the observation deck in the waterfront area on the south side of the site.

### 3.5 Plant design

A healthy vegetation landscape may generate an atmosphere that is conducive to healing, and the design of the plants in the therapeutic landscape may enhance the overall healing effect of the environment on people's bodies and minds[10]. The healing garden portion on the east side is where the plant design for this project is mostly concentrated. The core of the therapeutic garden becomes a plant labyrinth created by the hedge enclosing and pruning, which acts as a semi-isolated location to distract people and provides recreational activities. The option of plant species in the therapeutic landscape design is crucial, and the plants in the healing garden area must satisfy the visitors' various sensory needs[11]. To accomplish the design objectives of planting diversity and sustainable development requirements, create a green and healthy healing waterfront landscape, and enhance the comfort and attractiveness of public outdoor space, plants native are primarily utilized to the Songjiang region of Shanghai for this design.

### 3.6 Special node analysis

(1) Reading devices in the lawn

The lawn reading gadget, which can accommodate 5-7 persons reading simultaneously and deliver a place to relax, is composed of wooden components that have been joined together, which is low-carbon and ecologically friendly. It also provides greater access to nature and spiritual healing while soaking up the sun.

(2) Grass Steps Plaza

The seaside path within the property runs adjacent to the Grass Steps Plaza, mitigating the harsh and tranquil sensation of the hard pavement. It may also accommodate regular festival events including flea markets, amusement fairs, public concerts, and other special occasions.

(3) The circular bridge

Red is employed as the primary eye-catching hue across the site to draw attention to the circular bridge, which performs the dual purposes of slowing down traffic and providing a bird's-eye view of the surrounding landscape. In times of public health crises, it can also help isolate the mob and disperse the distraction.

(4) The central plaza

A modest water feature and a planting space for trees are employed in the center plaza, which has been constructed up of multiple circles that have been sliced into one another to soften the harsh site. Large trees are utilized as dividers and environmentally friendly materials are employed to create strip grilles in the area next to the parking lot. A elevated section in the plaza's northern corner serves as a rest space for various numbers of visitors. Visitors may be provided the safety distance and the road will be beautified at the same time by using LED "space spectrum" floor paving in the entry and departure zones on both sides of the plaza. The road's asphalt is integrated with the neighborhood, providing a sense of comfort and directing traffic.

### 3.7 Special design

(1) Hand washing device

At resting areas like pavilions and verandahs, hand cleaning devices are installed. To operate this gadget, simply insert your hand between two striped poles, and it will automatically spray hand sanitizer and disinfectant to disinfect your hands,As shown in Figure 3.


**Fig. 3.** Hand washing device

(2) Outdoor handrail disinfection device

Install the outdoor handrail disinfection device at the handrail of the circular corridor railing. The device is equipped with a built-in power supply, a two-way handrail ultraviolet irradiation lamp, a human body sensor, and other features. It shuts off automatically when it is placed on the handrail, ceased disinfecting when no one is around, and switches off after more than 10 minutes if no one is disinfecting,As shown in Figure 4.


**Fig. 4.** Outdoor handrail disinfection device

(3) Disinfection sprinkler system

Several disinfection sprinklers have been placed throughout the landscape plan, including two separate pipeline systems. For daily fog landscape settings that improve ambiance and regulate the microclimate, one set is utilized. The other set is employed for routine and exceptional times when the landscape park needs to be thoroughly cleaned to raise the park's health rating,As shown in Figure 5.


**Fig. 5.** Disinfection sprinkler system

## 4 Conclusion

Research in the domains of landscape architecture will increasingly concentrate on the philosophy and practice of restorative landscape design in the context of actively fostering healthy cities. Chinese researchers continue to strive to further their understanding of therapeutic landscape design. In order to effectively contribute to the development of a healthy city, this paper features the case of the waterfront green space design of Shanghai Wulong Commercial Plaza with practical research. Which then proposes the design strategy of restorative landscape from two levels of physical space and behavioral space with the design idea of attracting, encouraging, and healing step by step.

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