



# Healing Landscape Design for Communities to Build Healthy Cities: A Case Study of Guanxi Community, Wuhan

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**Abstract.** Communities, as the smallest units of the urban ecosystem, play a critical role in shaping residents' daily lives, with their landscape features greatly influencing the quality of life. Along with the pursuit of healthy cities, the focus of community landscape design has shifted from mere aesthetics to the healing potential of these spaces. Healing landscapes alleviate physical and mental stress and enhance the overall quality of public spaces within communities. In this study, we integrate principles from environmental psychology and healing garden design to propose strategies for the landscape renewal of aging communities. Interviews are conducted as part of the design and redevelopment process for the healing landscape of the Guanxi Community in Wuhan.

**Keywords:** healthy city, healing landscape, public health, community landscape.

## 1 Introduction

Urban public spaces serve various functions, with healing and rehabilitation essential for residents' sustainable well-being. The COVID-19 pandemic in 2020 brought renewed attention to the physical and mental health of urban residents. Living in disorganized environments can adversely affect well-being, while green open spaces in communities not only provide areas for leisure, exercise, and social interaction but also serve as sanctuaries during public health emergencies, offering psychological comfort and promoting recovery. The healing landscape represents a form of green defense for community public health. Its design and layout embody a deeper integration of natural and public health sciences. By meticulously arranging plants and incorporating topographical features and water bodies, these landscapes are designed to foster mental and physical recovery. This approach highlights the harmonious coexistence between humans and nature, striving to achieve the ideal state of "unity of man and nature" and "Tao models itself after nature" from ancient Chinese philosophy. Such a framework lays a solid foundation for building healthier, more resilient communities and urban environments.

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The concept of healing landscape design originated in the UK and has been applied in various countries. A review of healing landscape applications in China reveals that such designs align well with residents' lifestyles and help regulate their emotions. However, there is currently a lack of research focused on cities like Wuhan, which are characterized by high temperatures. Thus, this study is particularly necessary, especially given the fact that numerous communities in Wuhan require environmental enhancement.

In 2022, Wuhan released the "14th Five-Year Plan for the Development of Healthcare and Health Promotion," which emphasizes improving living conditions, increasing green coverage, and creating a healthy and livable urban environment through urban planning and environmental remediation. The plan specifically calls for enhancing the environmental quality of aging communities, improving both the configuration and governance of community spaces. Notably, this research aligns well with the objectives outlined in the plan. This study investigates the environmental quality of aging communities to derive design strategies for healing landscapes, aimed at enhancing the existing community environment and proposing design solutions for residents' physical and mental well-being.

In this study, we integrate healing landscape theory to develop design strategies for updating healing landscapes in aging communities. The approach focuses on the community as the research unit, conducting site investigations to identify potential needs among residents. This aids in spatial planning for open public spaces in aging communities and proposes rational design methods for healing landscapes, addressing the gap in residents' needs for public spaces, and promoting sustainable urban health. Research data is collected through various open data platforms, including surveys, government websites, and mapping information.

The paper consists of six sections. In the first section, we discuss the health needs of urban residents and the demand for healing landscapes in Wuhan's communities. In the second section, we review the development of healing landscape research and community landscape studies. In the third section, the research methodology is outlined. In the fourth section, we detail the research materials. The results are presented and discussed in the fifth section, while recommendations for future research are concluded in the sixth section.

## **2 Literature Review**

### **2.1 Healing Landscape**

Edward O. Wilson's biophilia hypothesis posits that humans are inherently predisposed to respond positively to nature. Kaplan's attention restoration theory further develops this idea, suggesting that contact with nature leads to protective effects that enhance human health and well-being. Healing landscape design has evolved from public buildings to horticultural spaces and more open community areas. Scholars have proposed optimization strategies to improve the accessibility and quantity of green spaces, as well as the design of public facilities and landscape elements. For instance, some researchers, like Sackler, have begun to explore the role of environ-

mental aesthetics, while others have investigated the mental health impact of built environments, and identified two impact pathways, including sensory direct effects and psychological impacts. Additionally, researchers such as Gascon have found that factors related to climate, living conditions, and regional cultural characteristics differ in their influence on mental health.

Currently, Chinese research on healing landscape design at the macro scale is well-established, and research at the meso and micro scales has become a hot topic [1]. Present studies focus on the positive effects of healing landscapes, examining how green open spaces contribute to residents' physical, psychological, and social well-being. Concepts like healing gardens, garden cities, and community building are widely reflected in landscape design practices, which are becoming significant topics in public health and urban environmental research. In the realm of healing architectural design, scholars have expanded their research scopes beyond traditional medical buildings to address the healing environments for specific populations. Taking the aging communities as an example, researchers have conducted detailed investigations, leading to the construction of healing environment design frameworks aimed at providing more human-centered spaces for this demographic. Moreover, the research scope has extended to various contexts of healing design, including campus landscapes and the integration of art therapy in urban furniture design, showcasing the broad applicability of healing design in promoting individual health and enhancing the quality of life. This interdisciplinary research field merges various perspectives from urban planning, architectural design, and public health, providing both theoretical and practical support for building healthier, more livable cities.

## 2.2 Community Landscape

Research on community landscapes in China has been steadily increasing. With rapid economic development, residents' expectations for their living environments have risen, making the renewal and enhancement of community landscapes both necessary and aligned with the demands of community revitalization and policy guidance.

The arrival of an aging society has intensified the need for age-friendly community design, prompting a surge in academic research in this area. Scholars have explored various aspects, including the physiological comfort, psychological needs, daily behaviors, and elder care requirements of the elderly population<sup>[2-6]</sup>. Additionally, they have conducted theoretical and practical studies on community planting areas<sup>[7]</sup>, edible landscapes<sup>[8-10]</sup>, and smart elderly care<sup>[11-12]</sup>. Scholars also extend their research to other age groups, with a focus on optimizing community landscapes from the health perspectives of children and adolescents<sup>[13-16]</sup>. In the construction of healthy cities and pandemic challenges, researchers have shifted their focus towards enhancing community resilience, developing resilient landscape settings, and addressing public health concerns<sup>[17-19]</sup>. Following the trends of big data development, some researchers have explored strategies for intelligent community design based on smart city initiatives.

### 3 Methods

Healing landscapes are characterized by four key features: tranquility, connection to nature, openness, and sheltering functions. Therefore, in the design of community landscapes, it is crucial to intersperse open and semi-open spaces to provide residents with both spaciousness and shelter. This approach not only enhances psychological safety but also fosters intimate contact with nature, thereby reducing oppression with increased visibility. According to Yoshinobu Ashihara’s street aesthetics theory, the space of a street space will make people feel oppressive when the ratio of street width to building height (D: H) is less than 1<sup>[20]</sup>. Drawing on horticultural therapy theory, plant configurations in residential areas should engage all five senses. The planting designs should primarily feature ornamentation, fragrance, and practicality, with a focus on aromatic plants and perennial flowers<sup>[21-22]</sup>. This strategy aims to increase the concentration of negative air ions in the residential environment, thereby improving the air quality of public spaces. Given that Wuhan’s climate differs from the areas specified in theories, the selection of plants must consider local climatic characteristics.

### 4 Materials

In this study, we focus on the urban area of Guanxi Community located in Hongshan District, Wuhan, China, characterized by its residential convenience yet aging infrastructure. The Guanxi Community enjoys a prime location adjacent to the core area of Optics Valley, with accessible transportation and various supporting facilities nearby. The community comprises 52 buildings and includes three kindergartens and one elementary school, leading to a relatively low density of open activity spaces. Established nearly two decades ago, the spatial layout and planning of Guanxi Community no longer meet the growing comfort demands of its residents. After the COVID-19 pandemic, the vibrancy of public spaces within the community continues to decline.

In this paper, we investigate the public activity spaces of the Guanxi Community. Based on a questionnaire survey reflecting resident needs and on-site research, several issues have been identified, including unreasonable public space planning, limited functionality for various age groups, excessive hard paving that hinders activities, and a lack of diversity in plant species. After the research it was found that there are some problems in the site, shown in the table(Table 1) below.

**Table 1.** Problems in the Guanxi Community

Problems	On-site Photos	Solutions
Aging infrastructure		Upgrade facilities

Stalls occupying sidewalks		Introduce movable market structures
Litter accumulation		Implement proper waste management facilities
Mixed pedestrian and vehicular traffic		Redesign traffic flow
Insufficient activity spaces		Increase types of activity spaces
Excessive hard paving		Revise paving methods
Limited plant diversity		Introduce more plant species

In light of these challenges, we select the largest open space within Guanxi Community for healing landscape design, aiming to upgrade the basic public facilities, arrange activity spaces suitable for different age groups, and incorporate venues catering to all age stages. The design includes micro-topography modifications, creating varied heights across the originally flat plaza, thus increasing the usable area and spatial complexity while providing residents with a broader visual experience.

The site is organized into dynamic and serene functional zones. The more active area features a children's play area, sandpit, open theater, and sports plaza, while the quieter section includes a painting plaza, resting corners, a healing garden, and a meditation area. This arrangement enhances residents' opportunities to engage with nature, fostering tranquility for those seeking relaxation in a high-pressure environment. Following foundational principles of healing landscape design, the project minimizes hard surfaces, introduces slow-walking paths, and uses bright colors to guide residents towards jogging and walking. To address the presence of immovable water pump facilities, landscaping with plants and fences will obscure their appearance, providing

residents with sheltering functions and reinforcing the healing characteristics of the space. Given Wuhan’s substantial summer rainfall, a rainwater collection system is proposed to efficiently utilize natural precipitation and reduce irrigation needs.

Due to the specific plant requirements for the healing garden, the selection will align with local climatic conditions. Wuhan experiences a subtropical humid monsoon climate with distinct seasons, ample rainfall, high humidity, and elevated temperatures. Therefore, cold-resistant, heat-tolerant, and moisture-loving plants will be selected to adapt to the seasonal climate variations. A combination of evergreen and seasonal flowering plants will create a multi-layered landscape effect. The following table (Table 2) details the chosen plant species:

**Table 2.** Rain Garden Plant Configurations

Plant type	Plant name	Characteristics
Evergreen	<i>Osmanthus fragrans</i>	It features a pleasant fragrance, an extended blooming period, and is highly compatible with Wuhan’s climate.
	<i>Rhododendron simsii</i>	It displays flowers in spring with vibrant colors, demonstrating strong shade tolerance.
	<i>Bambusoideae</i>	It exhibits resistance to cold and moisture, symbolizes peace and purity, and cultivates a serene atmosphere.
Flowers	<i>Jasminum sambac</i>	It exudes a potent fragrance, maintains a prolonged blooming period, and is ideal for summer observation.
	<i>Rosa chinensis</i>	It offers a long flowering season, a wide range of colors, high adaptability, and blooms throughout the year.
	<i>Nelumbo nucifera</i>	It is well-suited for water gardens, contributing to enhanced landscape layering.
Herbaceous	<i>Lavandula</i>	It promotes relaxation of the nervous system, withstands drought conditions, and flourishes in sunlit environments.
	<i>Mentha</i>	Its invigorating scent helps alleviate stress and thrives in humid climates.
Vegetable and Herb	<i>Ocimum basilicum</i>	It embraces a soothing aroma, is easy to grow, and serves as an excellent choice for interactive therapeutic gardens.
	<i>Rosmarinus officinalis</i>	It is aromatic, supports improved concentration, and is resistant to drought.

### 5 Results and Discussion

Through a series of design strategies, in this study, we not only improve the physical environment of the public space in the Guanxi Community, but also enhance its psychological healing and social functions, providing a reference case for landscape renovation in aging communities. By focusing on resident needs, the natural environment, and design innovation, healing landscape design holds promise as an effective means to enhance community vitality and resident well-being. Future research should continue to deepen the practice of healing landscapes, particularly in areas such as plant configuration and climate adaptability, increasing resident participation, and developing long-term maintenance strategies. Furthermore, exploring the integration of healing landscape concepts with smart city technologies could yield fruitful results, such as employing intelligent systems to monitor environmental changes and dynamically adjust spatial designs, thereby further improving residents' life quality and spatial experiences. The figures below show the researcher's healing landscape design plans(Figure 1) and renderings for the existing site in the Kansai community(Figure 2).

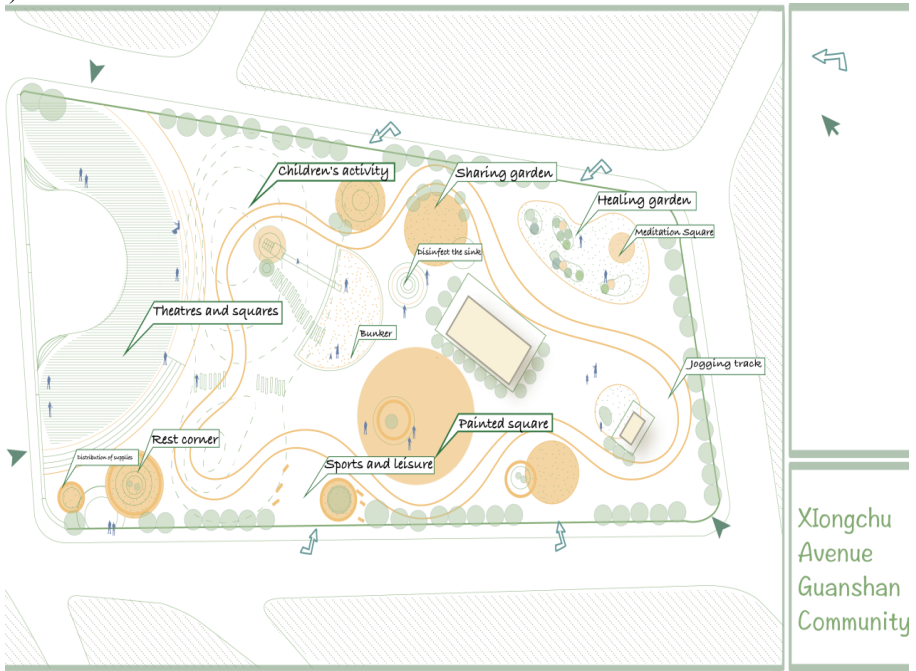


Fig. 1. Guanxi Community Landscape Update Plan Rendering



Fig. 2. Landscape update rendering of Kansai neighborhood

## 6 Conclusions

As the most frequently used space in the community, every detail of the community public space, from the scientific layout of the space to the creation of the environmental atmosphere, is directly related to the residents' living experience and the overall evaluation of the community. As a highlight of community design, public landscapes with healing properties are valuable in providing residents with a haven for relaxation and spiritual recovery. This study aims to propose strategies for the renewal of public spaces in older neighborhoods by combing the design methods of healing landscapes. Through collecting residents' needs and field research, this study creates a practical and emotionally valuable space through rational layout and careful atmosphere creation. The future research direction should be devoted to deepening the practical exploration of the healing landscape, through the introduction of intelligent systems to monitor the environmental parameters, such as temperature, humidity, light, etc., to achieve dynamic adjustment and optimization of the space design, which not only enhances the functionality and comfort of the space, but also meets the residents' pursuit of personalized and intelligent living experience.

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