

Tudy on Urban Waterfront Space Renewal from the Perspective of Residents' Health

-- Take Suzhou Canal Waterfront Space as an Example

Hao Ding¹, Xiaoziyu Fang²

¹School of architecture and urban planning, Suzhou University of science and technology, China

²Kunshan Municipal Natural Resources & Planning Bureau, China

Abstract: Public health has increasingly become the focus of urban planning and design, and urban waterfront space, as an important place for the daily leisure activities of residents in Waterside Areas, its health value has not really been reflected in the actual planning. From the perspective of residents' health, this paper summarizes the promotion mechanism and influencing factors of waterfront space on residents' health, and makes a field survey on the waterfront space environment in Suzhou outer city to explore its influencing factors on residents' health, and puts forward the waterfront space renewal strategy to guide citizens' healthy behavior, further improve residents' health and happiness in life, and promote the sustainable development of human settlements in waterfront areas.

Keywords: Health perspective; waterfront space renewal; Suzhou canal.

1. Introduction

The ancient settlements lived by the water and the ancient civilization originated from the water. Throughout the long evolution process, human beings have always maintained their instinctive dependence and closeness to natural water bodies. In modern society, urban waterfront spaces, as one of the areas with the strongest interaction between human activities and natural processes, should play a key role in maintaining the balance between nature and artificial systems and safeguarding public health and well-being; However, in actual planning practices, we often pay more attention to its visual benefits, while ignoring its ecological value and health promotion. This article is based on the concept of resident health proposed by the World Health Organization (WHO), and deeply studies the promotion mechanism and influencing factors of waterfront space on resident health; Taking the waterfront area of Suzhou outer city as an example, it reveals its influencing factors on residents' health; It also puts forward the strategy of waterfront space renewal to guide citizens' healthy behavior, further improve residents' health and happiness, and promote the sustainable development of human settlements in water villages.

2. The promotion Mechanism and Influencing Factors of Urban Waterfront Space on Residents' Health

The traditional concept of health is physical health without disease, but for modern people, health is a comprehensive concept. In the 1970s, the World Health Organization (WHO) gave a comprehensive definition of health: "Health is not only the absence of physical diseases, but also comprehensive health with psychological, spiritual and social adaptability. Based on this definition, the following will focus on the promotion mechanism and influencing factors of urban waterfront to residents mental health, physical health, and

social health.

2.1. Promotion mechanism and influencing factors of waterfront space on residents' mental health

A good natural environment is of great significance to improve the stress levels and physical and mental recovery of residents [1]. Currently, there are two main theories in academia explaining the relevant content: Ulrich's stress reduction theory and Kaplan's attention recovery theory.

Decompression theory holds that in the long-term evolutionary adaptation process, the natural environment affects the development of human beings, making it easier for us to resonate with the natural environment and produce positive emotions when we are in it, thus producing a decompression effect [2]. Based on empirical research, the following conditions should be met in the restorative environment. The environment should have appropriate depth and complexity, and have clear structures and nodes; There should be abundant natural elements in the environment; There is no potential danger in the environment; The surface textures tend to be consistent; There is a visual corridors or distant echoes in the surrounding environment [3].

According to the attention recovery theory, with the increase of concentration time, a person's concentration ability will gradually weaken, resulting in difficulty in concentration, emotional excitement, and mistakes in the work that needs concentration. At this point, it is necessary to seek the natural environment as a place to restore their attention [4]. The Kaplan couple proposed, based on empirical research, that a natural environment with the following four characteristics can help users promote their focus recovery: the environment should have distancing, allowing users to detach from tedious thoughts and stress; The environment should be attractive enough to attract the attention of users; The environment needs to be extensible and rich enough to continuously grasp the attention of users; The environment should be compatible and the services provided by the environment should meet the needs of users [5].

Hannah from the University of Washington confirmed through her experiments that compared with other residents living far away from the green open space, residents living near high-quality green open spaces have fewer psychological symptoms such as depression and depression, and their attitude towards life is more optimistic [6]. The above empirical and theoretical evidence confirms that the natural environment has a positive role in promoting the mental health of residents. Compared to a single natural environment, waterfront space, as a collection of green and blue natural environments, provides more abundant natural resources for urban residents, and should be a better recovery environment to promote their mental health.

2.2. Promotion mechanism and influencing factors of waterfront space on residents' physiological health

The role of waterfront space in promoting residents' health is mainly reflected in two aspects. First of all, it has its own ecological health benefits, mainly reflected in the following aspects: environmental factors such as fresh air, sunshine, running water, plant aroma, etc. They directly affect the physiological and biochemical processes of human body; Through the residents' sense organs (vision, smell, hearing, touch, etc.), the elements in the waterfront space are captured, which brings good physiological stimulation [7].

Secondly, waterfront spaces have a promoting effect on physical activity among the population, thereby having a more long-term impact on residents' health. Pretty revealed that sports activity have a positive impact on physical and mental health, and contact with nature can enhance mental health; Therefore, green movement can synergistically enhance the physical and mental health [8]. Positive emotions can stimulate residents to engage in sports activities, but negative emotions are the opposite. As an external stimulus, waterfront spaces can effectively improve people's mood during exercise, increase their willingness to take part in physical exercise again, and guide residents to develop a healthy lifestyle in the long run.

Orpela, an American behaviorist, also confirmed the above view through experiments. Compared to other types of public spaces, 50% to 60% of adults prefer going to public places with natural features for leisure activities [9]. In 2002, a long-term study was conducted in Japan, and it was found that elderly residents living near streets or parks with high green space rates lived longer and had higher happiness than those living in ordinary communities [10]. The above empirical and theoretical evidence confirms the role of waterfront spaces in promoting residents' physical health. Tan and so on. It is believed that the factors that stimulate residents' active participation in space activities include: accessibility of the built space; The design of built-up site; The coordination of various elements in the architectural environment [11]. The aesthetic feeling and sense of security in the architectural environment. As a building environment with ecological advantages, waterfront spaces is of great value and significance in improving and promoting sports activity and enhancing people's health.

2.3. Promotion mechanism and influencing factors of waterfront space on residents' social health

Social health refers to the healthy state of social relations

between individuals and others and the outside world. It expresses an evaluation of social capital and reflects their ability to adapt to the outside world [12]. A healthy waterfront space can promote communication between people, thus creating and upgrading social capital and improving people's social health. At the same time, it can effectively prevent and restrain the occurrence of criminal acts and promote the harmonious development of society [13].

Theoretically, the influence of the urban space environment on social capital can be further embodied in two aspects: social support and social security. John Cassel and Cobb Sydney put forward the social support theory, which holds that social contact between individuals can promote mutual understanding and get emotional support from each other [14]. The spatial environment belonging theory proposed by Irwin Altman and Setha Low states that place belonging refers to the positive connection formed between an individual or group and the socio-physical environment, which can be manifested through emotional, cognitive, and behavioral psychological processes. Including the emotional attachment to a place, and the degree to which this place meets the needs of individuals or group. A sense of local belonging can promote the effect of environmental restoration [15]. When social and interactive places can meet people's specific use needs, it is conducive to people's dependence on places and further promote the formation of social ties [16].

Social security is another important factor that affects the formation of social capital. Green open spaces can enhance the sense of security in the surrounding environment, thus increasing opportunities to improve social capital [12]. Research shows that there is a positive correlation between the number and size of trees in public spaces in the community and crime rates. In the urban environment with medium and high density, the crime rate is usually lower in areas with tall and diverse trees. The above empirical and theoretical evidence proves that a friendly interpersonal environment can promote the social health of residents. A friendly waterfront social environment contains a safe space; Promote close communication between people and provide strategies and places; Local people have a sense of belonging; The venue embodies fairness and guides people from different backgrounds to participate actively. As a kind of social public resource, urban waterfront space plays a vital role in promoting interaction and communication among social groups.

3. The Impact Factors of Outer City Riverside Water Space on Residents' Health

Based on the study of the above-mentioned influence mechanism, the author made an investigation on the present situation of the waterfront space in the outer city of gusu district, Suzhou. The outer city river, with a total length of 73 km, is the location of many world cultural heritage sites and garden squares, and is also known as the flowing living corridor heritage. The Millennium Canal is thriving because of its historical and cultural heritage, and the healthy city practice in Suzhou has given it new value and significance. This paper will comprehensively evaluate the health influencing factors of the waterfront space in the outer city from two aspects: the material elements and the spiritual elements of the place.

3.1. Material elements of the venue

3.1.1. Serious water pollution and poor ecological resource quality

A. Water pollution is serious: Although Suzhou has taken various measures to improve the water quality of rivers in recent years, the water quality of rivers has not been improved fundamentally. Because the water level of some river has decreased slightly, the discharge of domestic sewage, production wastewater and other pollutants greatly exceeds the ability of water bodies to absorb and purify pollutants, resulting in water pollution and greatly affecting their ecological and health benefits.

B. Poor greening and maintenance: the overall greening level inside the ancient city is good, and the landscaping is exquisite. However, there are still some waterfront spaces along the Outer Urban River. There are some problems, such as improper collocation of plant landscape, single choice of planting species and lack of natural beauty in garden art; Lack of high-level design and management in greening management leads to disorderly, shabby and messy landscape resources Phenomenon. These disturbances will reduce the attraction of the site to residents, hinder them from obtaining ecological value directly, and thus weaken the promotion of ecological elements on residents' physical and mental health.

3.1.2. Insufficient hydrophilic experience and poor performance of waterfront features

There are some problems in the planning and design of many waterfront spaces, such as lack of waterfront design, low safety factor of bank protection design, lack of natural beauty in shoreline design and lack of clear landscape corridors. All these will affect residents' waterfront experience and prevent them from directly contacting healthy ecological resources, thus greatly reducing the role of waterfront spaces in promoting residents' physical and mental health.

A. Waterfront design lacks hydrophilicity There is a lack of well-designed hydrophilicity and water game platforms inside the venue; Unreasonable entrance and exit of waterfront trails, and the lack of interest in hydrophilic design will reduce the enthusiasm of residents to participate actively and limit their possibility of further participating in many

experiential water facilities.

B. Stiffness of the revetment design

The revetment is designed with stone pavement, which has high rigidity, separates the waterfront and water spaces, and has poor natural permeability. At the same time, it has a negative impact on the survival and reproduction space of plants and animals around the river bank, destroying the biodiversity of the waterfront space; Some revetments did not consider the selection of anti-slip materials in their material selection, which poses a certain level of danger for those near water.

C. The design of the shoreline is opaque When the shoreline is planned, the waterfront landscape sequence was not organically coordinated with the urban landscape background. Tall trees, walls, buildings and other visual barriers are installed on multiple viewing platforms, which leads to the lack of transparency in the landscape visual corridor and prevents the outside world from entering the open space.

3.1.3. Fitness facilities meet low requirements and have limited physical stimulation effects

The fitness facilities in many waterfront spaces along the Outer City River have the problems with low satisfaction and insufficient maintenance, which will reduce these problems. The enthusiasm of residents to actively participate in physical exercise has reduced the effect of waterfront space on promoting physical and mental health.

A. Low satisfaction with facilities

It mainly reflected in two aspects: the total number of facilities is insufficient and the types of facilities are incomplete. Existing facilities can not meet the growing daily fitness needs of residents. During peak hours, some facilities need to be lined up for use; The single type of facility is mainly manifested in the lack of fitness trails and the repeated placement of equipment with the same training function.

B. Poor maintenance of facilities

The facilities are not clean and disinfected, the use of facilities lack guidance and safety instructions, the damaged facilities have not been repaired or replaced in time, and some facilities have potential safety hazards.

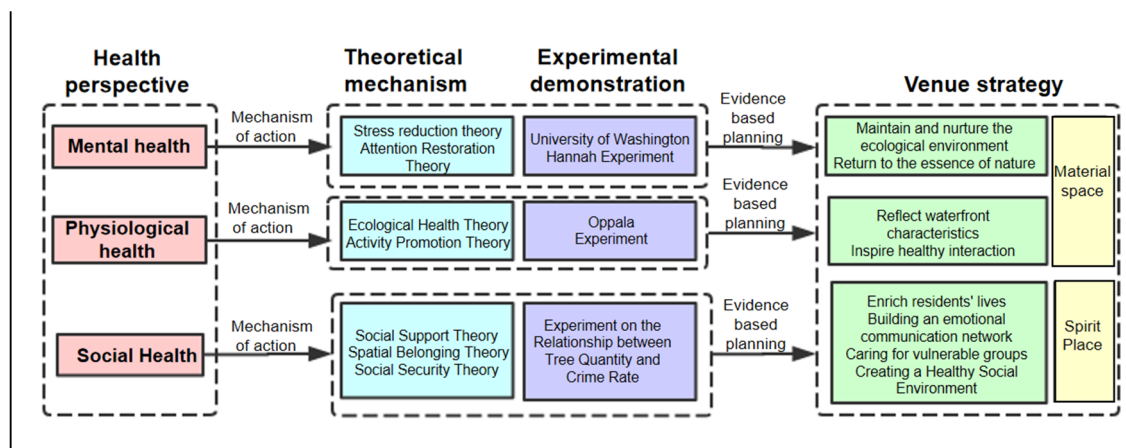


Figure 1. Research roadmap of waterfront space renewal from the perspective of residents' health

3.2. Spiritual elements of the place

There are few waterfront spaces that organize themed activities to promote social interaction among residents, lack exhibitions of regional folk activities, and lack public welfare

services from volunteer service clubs. According to residents' feedback, vulnerable groups in the local society (such as migrant workers, people with disabilities, widowed elderly, and people with mental illnesses) are less integrated into their social communication networks. Various phenomena reflect

to a certain extent that the spiritual support of the place is neglected and put on hold, and the space lacks a sense of belonging and cohesion.

4. Urban Waterfront Space Renewal Strategy Guided by the Concept of Health

4.1. Transformation strategy of material space

4.1.1. Natural Environment: Maintain the ecological environment and return to the essence of nature

A. Water quality improvement

First of all, it is necessary to strengthen the monitoring and management of urban river water quality, so as to make it meets the water requirements for ornamental and recreational landscape environment in Urban Sewage Reuse: Water Quality of Landscape Environment [18], and use big data intelligent monitoring systems to carry out real-time pollution warnings of urban sewage exceeding the standard; Secondly, it is necessary to rationally adjust the urban drainage mode, and strictly control the domestic and production sewage to exceed the standard and be directly discharged into water bodies; Finally, strict management systems will be established, and the residents' sense of responsibility to control water pollution will be enhanced through reward and punishment systems, river length systems and other measures.

B. Green maintenance

Paying attention to the suitability of plant configuration means that different types of waterfront spaces are focused on according to their scale and service targets. Large deciduous trees with large crown and lush foliage should be selected for the edge areas of sports and leisure areas. Enable residents to have a resting space in the open air for summer coolness and winter sunshine enjoyment. In addition, the use of flying floc, fruit drop and poisonous plants should be avoided, and the proportion of aromatic and dust-resistant plants should be appropriately increased [19]. Rich plant species: In addition to selecting some herbs and climbing plants, you can also select some aromatic medicinal plants for external treatment. By using the method of patch planting, a strong aromatic aroma can be created, and internal therapy and comprehensive plants are used as isolation zones between different aromatic plant groups to ensure the clarity and purity of the aroma [19]. Creating a participatory plant landscape: some flower planting ponds, small fish ponds, rattan frames and plant fences can be set up on the open space in the waterfront area for citizens to do it themselves, so as to promote mutual assistance and cooperation among residents and promote the healthy exchange between man and nature. Implement the greening subcontracting system: the current greening area will be subcontracted to the nearby elderly residents, who can apply voluntarily and get some rewards. This can not only release the value of the surplus energy of the elderly, but also help them regain social identity.

4.1.2. Artificial environment: Reflecting waterfront characteristics and stimulating healthy interactions

A. Enhance visual extension

It needs to strengthen the visual resonance between green open spaces and the surrounding environment, and focus the visual focus of waterfront spaces on natural elements as much as possible. By means of visual corridors and axis, the visual focus will intersect with natural mountains, islands and sea levels, and then moderate and symmetrical waterfront

buildings will be developed to form an open and spacious urban waterfront interface.

B. The promotion of direct contact

It needs to promote direct contact between people and water through buildings protruding from the water surface, elevate water walkways, platforms protruding from the water surface, squares facing the water surface, docks extending into the water, waterside walkways, etc. [20]. Also, it should extend water features to the waterfront or internal areas, create static shallow pools or interactive water features, and provide more opportunities for water immersion, play, and appreciation. In addition, we should also pay attention to the safety protection of the coastline: the design of bank protection should first meet the requirements of disaster prevention, and before planning, we should fully investigate the flood control data such as flood cycle and submerged area; Secondly, under the condition of not destroying the natural topography, landforms and ecological habitats of the coast, we should try our best to plan and design the revetment [18].

C. The encouragement of active participation

Active participation refers to purposeful and active participation in waterfront spaces, which can maximize the health benefits of waterfront spaces and cultivate healthy lifestyle of residents. Meet the health needs of residents through a friendly walking environment and rich fitness facilities. The construction of fitness trails should emphasize fairness, safety, accessibility, comfort, continuity and selectivity, reduce the interference between motor vehicles and non-motor vehicles, ensure smooth walking systems and meet the needs of different groups of people; At the same time, fitness trails should be combined with urban pedestrian trails, squares, gardens and multi-level slow traffic systems [21].

When configuring fitness facilities, a big data intelligent analysis system is used to predict the number of users of the facilities, optimize the configuration of fitness facilities, their internal functional layout and process organization, carefully design the dimensions of each component, and equip them with intelligent facilities and equipment (such as health monitoring sensors) At the same time, through the Internet of Things and artificial intelligence, the physiological indexes of the fitness crowd are monitored to scientifically guiding people's fitness behavior. On the other hand, related safety and public service facilities should be added, such as emergency rescue buttons or call devices, necessary direction signs, etc., to provide better experience for users of fitness spaces, attract residents to participate in fitness and improve the initiative in fitness [22]

4.1.3. Regeneration Strategy of Place Spirit

A. The enrichment of residents' lives and the establishment of an emotional exchange networks.

1. The organization of social activities and the promotion of emotional exchange

They should organize rich and vivid cultural and educational activities and theme education activities in the venue regularly to promote exchanges and interaction among residents, thus enhancing cohesion and sense of identity among residents. Festivals such as Double Ninth Festival, International Children's Day and Labor Day will hold festivals with different themes; Convene nearby elderly volunteers to perform in the venue in their spare time: talking about Suzhou, Suzhou pingtan, Suwei teaching, language learning and other activities enrich the retirement life of the elderly and enhance their sense of belonging. In addition, organizing some family parent-child activities to provide

children with natural science education and voluntary labor experience can also improve the relationship between parents and children. Carry out a series of residents' co-construction and sharing activities within the venue, such as sharing gardens, fish ponds and fences, so that residents from different backgrounds can get together, exchange experiences and chat with each other, and build a harmonious emotional exchange network.

2. The regular promotion of health knowledge and the enhancement of residents' health awareness

They should regularly organize health - themed education activities, regular public health check - ups, etc. It is to remind residents to pay attention to their own health and improve their health awareness.

B. Providing care for the disadvantaged groups and creating a healthy social environment

1. Elderly: they should adopt the active aging model, build a contribution platform for the elderly [23]. And, they should organize the elderly in nearby community to actively participate in voluntary services, give play to the value of waste heat, and help them regain social recognition. Also, they should establish a team of intergenerational volunteer to help the widowed elderly safely arriving at the venue to enjoy a healthy environment and help them solve some difficulties in their life.

2. Disabled and depressed individuals: they should unconsciously use music therapy for psychotherapy in venues, set up a professional psychological volunteer team, and regularly carry out exchange activities such as listening to heart and role model power to let the disadvantaged groups release their emotions, make equal friends, and establish a positive and sunny attitude towards life. Carry out a series of psychological tests and health talks regularly, continuously pay attention to patients, guide them to seek medical treatment actively, and establish a healthy attitude.

5. Conclusion

Because of the diversity and openness of its resources, waterfront spaces attracts the public for leisure, entertainment and sports. With the implementation of "Healthy China Action", urban waterfront spaces is bound to become an important carrier for building a healthy cities. This article provides a comprehensive summary of the health effects and scientific evidence of waterfront spaces, and evaluates the health value of waterfront spaces in the outer city of Suzhou as an example. Finally, corresponding strategy of site renewal is put forward. I hope this paper can provide some enlightenment and reference for the theoretical research and practical operation of healthy cities in China.

Acknowledgement

Sincere thanks to Professor Lingyun Fan and Professor Fei Lv from Suzhou University of Science and Technology for their academic guidance and suggestions on this article.

References

- [1] Xu Leiqing Restorative Environment, Health, and Green Urbanism [J]. Southern Architecture, 2016(03):101-107.
- [2] ULRICH R S, SIMONS R F, LOSITO B D, et al. Stress recover during exposure to natural and urban environments[J]. Journal of Environmental Psychology, 1991, 11(3): 201-230.
- [3] ULRICH R S. Aesthetic and affective response to natural environment[M]//ALTMAN I, WOHLWILL J F. Behavior and the natural environment. Boston: Springer, 1983.
- [4] KAPLAN S. The effects of management buyouts on operating performance and value[J]. Journal of Financial Economics, 1989, 24(2): 217-254.
- [5] KAPLAN S. The restorative benefits of nature: toward an integrative framework[J]. Journal of Environmental Psychology, 1995, 15(3): 169-182.
- [6] Cohen-Cline H. Access to green space, physical activity and mental health: a twin study[J]. Epidemiology Community Health, 2015(69): 523-529.
- [7] Peng Huiyun Mechanism and spatial optimization of restorative environmental impact in community parks [D]. Chongqing University, 2017
- [8] LOUREIRO A, VELOSO S. Green exercise, health and well-being[M]//FLEURY-BAHI G, POLE, NAVARRO O. Handbook of environmental psychology and quality of life research[M]. New York: Springer, 2017: 149-169.
- [9] Orpela K, Hartig T. Restorative qualities of favorite places[J]. Journal of Environmental Psychology, 1996(16): 221-233.
- [10] Li Min, Ye Changdong Threshold standards and global distribution characteristics of high-density cities [J]. World Geographic Research, 2015, 24 (1): 38-45
- [11] Tan Shaohua, Guo Jianfeng, Zhao Wanmin Research progress on alleviating mental stress and fatigue recovery in urban natural environment [J]. Regional Research and Development, 2010, 29 (04): 55-60
- [12] Ma Ming, Cai Zhenyu Research on Health Effectiveness and Design Response of Urban Green Open Space from a Health Perspective [J]. Chinese Landscape Architecture, 2016, 32 (11): 66-70
- [13] Zhang Chenghan, Gao Xiaoming Research on Design Guidelines for Urban Public Spaces Guided by Health Concepts [A]. 2019 China Urban Planning Annual Conference Chongqing city, China. two thousand and nineteen
- [14] ULRICH R S. Effects of gardens on health outcomes: theory and research[M]//MARCUS C, BARNES M. Healing gardens: therapeutic benefits design recommendation. New York: Wiley, 1999.
- [15] Liu Qun Yue, Wu Yu, Xiao Yiheng, etc Research on the Psychological Model of Urban Park Restoration Evaluation: Based on the Perspective of Environmental Preference and Place Attachment Theory [J]. Chinese Landscape Architecture, 2019, 35 (6): 39-44
- [16] SCANNELL L, GIFFORD R. Defining place attachment: a tripartite organizing framework[J]. Journal of Environmental Psychology, 2010, 30(1): 1-10.
- [17] Kuo F E, Sullivan W C, Coley R L, et al. Fertile ground for community: inner-city neighborhood common spaces[J]. American Journal of Community Psychol, 1998(26): 823-851.
- [18] Yang Yuwen, Dong Yewen, Liu Xueming, etc Waterfront Space in Urban Central Areas from the Perspective of Healthy Cities: Theoretical Mechanisms, Scientific Evidence, and Key Elements [J]. Shanghai Urban Planning, 2020 (02): 57-63
- [19] Chen Zhen, Lv Xu Survey and Analysis of Plant Landscape in Elderly Care Institutions in Nanjing from a Health Perspective [J]. Anhui Agricultural Science, 2020, 48 (5): 130-134, 137
- [20] Peng Yi Research on the Construction and Design of Landscape Space System in Urban Waterfront Areas [D]. Hunan University, 2009
- [21] Yellow wings Design elements of urban waterfront space [J]. Urban Planning, 2002 (10): 68-72

[22] Wei Xiaofang Planning and Reflection on Residents' Fitness Spaces under Sudden Public Health Emergencies [J]. Planner, 2020, 36 (06): 69-71

[23] Lv Fei, Yang Jing, wear the trump card The Road to Health Promoting Regeneration of Residential External Environment: Reflections on the Renovation of External Environment in Old Urban Residential Areas [J]. Urban Development Research, 2018, 25 (04): 141-146