Research on the Cultural Landscape Greenway Model of Water Network City——Taking Suzhou as an Example

Zixuan Xu¹, Jianwu Ma²*

¹ Gold Mantis School of Architecture, Soochow University, Suzhou, Jiangsu, 215123 China
² Soochow University-Yuanke Group, Collaborative Innovation Center of Architecture and Urban Environment, Suzhou, Jiangsu, China
Email: 870321788@qq.com

Abstract. Water network cities have special natural ecological characteristics, creating a good living environment. However, as the process of urbanization in my country accelerates, the lack of cultural characteristics and the destruction of the ecological environment have become serious obstacles to the development of water network cities. The harmonious water network bureau has changed in the past, and the contradiction between water cities has become increasingly prominent. The article researches and summarizes the construction principles and design techniques of cultural landscape greenways, and takes the water network city, Suzhou as a case to discuss the key points of the construction of cultural landscape greenways in Suzhou, and provide the cultural landscape greenway network practice in the water network city. Provide a certain theoretical guidance.

Keywords: Cultural landscape greenway, water network city, design mode, Suzhou

1. Introduction

Water has an important influence and position in urban development and natural environment. Since ancient times, the construction of cities in my country has been closely related to rivers and lakes. Cities such as Suzhou, Wuxi and Changzhou in southern Jiangsu are typical water network cities. These cities have developed water systems and dense river networks, forming a unique urban style [1]. At present, the regional natural landscape characteristics of water network cities are gradually Disappeared, the ecological security of water network cities is threatened, and the development of water network cities has encountered challenges and transformation needs.

Greenway is an effective way to solve the above-mentioned water network city problems. Greenway planning is based on the regional geomorphology, that is, the water system environment of the water network city, combined with existing natural and artificial infrastructure, to establish a comprehensive greenway infrastructure network. Greenway is a planning tool with important landscape ecological significance proposed by foreign scholars in the middle of the 20th century with ecological function as the core theory and can coordinate the relationship between man and land. It plays an important role in preventing habitat fragmentation, protecting water resources, protecting heritage corridors, and providing recreational opportunities.

Cultural landscape greenways are an important type of greenway network planning. It is a green passage connecting natural heritage, a linear landscape with a collection of special cultural resources, usually with a clear economic center, flourishing tourism, adaptive reuse of old buildings, entertainment and environmental improvement. Therefore, this paper studies the cultural landscape
greenway construction mode of water network cities, in order to solve the current problems faced by water network urban areas, and promote the construction and development of a better living environment.

2. Concept Definition
Cultural landscape greenway is a more scientific and advanced tool for green open space planning. It is a concept corresponding to the green corridor, a compound word of "cultural landscape" and "greenway". The key interpretation of cultural landscape in Cihai is: a landscape that acquires obvious new features through human activities in a natural environment. The formation of the cultural landscape is a long-term process, especially after the emergence of agriculture; cultural imprints are gradually left on the earth. Greenway is defined as a green land network containing linear elements, which is a sustainable green open space with multiple functions such as ecology, recreation, culture, and aesthetics. Therefore, in this article, the cultural landscape greenway is defined as: based on natural green corridors, linear elements green open for the purpose of protecting and developing projects or relics of universal value formed in long-term human activities and providing recreational and entertainment functions. Cyberspace, highways, railways, natural rivers, historical and cultural routes, and ancient canals are important design carriers of cultural landscape greenways. The multi-scale and multi-dimensional characteristics not only make the characteristic cultural landscape well protected and developed, but also protect and improve the ecological environment in the region, providing multiple functions such as ecology, leisure and recreation, and education.

3. Principles of Constructing Cultural Landscape Greenway
The construction of the greenway began in the 19th century when Olmsted in the United States planned the world's first public park system, the Boston Park System. The Boston "Greenway" is about 16 km long, connecting Franklin Park, Arnold Park, Jamaica Park, Boston Common and other green space systems [2,3]. The spatial pattern of green corridors is an important aspect of greenway planning. It is not only related to the ecological function of the greenway at the regional level, but also related to whether its constituent elements fit the texture of the city or the countryside at the city level, and whether the space reflects the function of cultural heritage conservation at the micro level. Therefore, in the process of planning and designing cultural landscape greenways, great attention should be paid to the construction of greenway space pattern from beginning to end. Mainly follow the construction principles in the following aspects.

3.1. Adjust Measures to Local Conditions and Respect Regional Patterns
Greenway planning and design should be a function-oriented landscape planning and design for a certain area. The pattern, skeleton, and urban texture of natural mountains and rivers are the basis and starting point of greenway planning and design. The construction of the greenway is not to change this framework, but to repair the current ecological instability caused by the disturbance of the artificial landscape based on the natural structure according to the principles of ecological design. It also respects the mosaic pattern of matrix-patches-corridor [4]. Because cultural landscape greenways must rely on the characteristics of cultural heritage sites, when the distribution of heritage sites may not conform to the local natural pattern, or even violate the local natural pattern, the selection of cultural landscape corridors should be based on the protection and utilization of cultural heritage sites as the first criterion, and the ecological nature of green corridors should be properly considered. But in this case, cultural landscape greenways should be connected with other types of greenways (such as ecological greenways) to form a comprehensive greenway network, so that it can not only perform the function of ecological restoration, but also fully protect it. Develop cultural landscape heritage sites. The route selection of the greenway should meet the requirements of protecting the natural ecological environment and maintaining biodiversity, and ensure the integrity of the ecological corridor [5].
3.2. Hierarchy of Spatial Pattern
Cultural landscape greenways have flexibility of scale, so when constructing the spatial pattern of greenways, attention should be paid to the level of the spatial pattern of greenways. At the regional level, it focuses on planning the greenway ecosystem to give play to the ecological restoration function of the greenway. At the meso level, it focuses on the rational connection of cultural heritage sites to improve the smoothness and convenience of sightseeing. At the site level, it focuses on the specific design of space construction and heritage cultural landscape construction to enhance the landscape taste of cultural heritage sites. The ecological, cultural, economic, recreational and leisure functions of the cultural landscape greenway are coordinated with each other to achieve the goal of maximizing comprehensive benefits.

3.3. Organic Combination of Constituent Elements
The greenway of the cultural landscape has many independent but organically integrated elements. These elements are not simply superimposed, they need to be adjusted flexibly. Generally speaking, when approaching important cultural landscape heritage, the components of the greenway must not only meet the needs of landscape construction, but also emphasize the purpose of heritage protection and development. The ecological function of green corridors is relatively important among the sites, and the ecological layout of characteristic natural resources should be the primary design principle. Landscape and ecological functions are equally important, because larger node areas usually provide space for sightseeing and rest.

3.4. Focus on the Combination of Points, Lines and Areas in the Distribution Pattern
The construction process of cultural landscape greenway is a process of connecting cultural heritage sites, scenic spots, waterfront recreational areas and green connecting belts to form a linear landscape belt. It is a comprehensive, complex system that integrates natural elements and humanistic elements. In this system, there are not only dotted cultural heritage sites and natural heritage sites, but also some historical and cultural ancient cities, scenic spots, and natural landscapes that exist in a plane shape, and there are also green connecting belts that exist in a linear shape. In the process of constructing cultural landscape greenway, the characteristics of each element should be brought into play, and the construction should be arranged reasonably.

4. Construction and Design Method of Cultural Landscape Greenway
Cultural landscape greenway is a comprehensive greenway project with cultural protection, landscape ecology, tourism development functions, and leisure and entertainment properties. The key point of its construction lies in the need to integrate and coordinate various resource elements in the corridor to integrate them into an organic whole. The overall goal of cultural landscape greenway construction is to realize the preservation, protection and development of cultural heritage, which is the key to the organic integration of history, culture, environment and entertainment.

The construction of cultural landscape greenways can be roughly divided into three aspects: network layout, mutual penetration of the environment, and symbolic memory.

4.1. Network Layout
In the process of constructing cultural greenways, a networked, green open space with cultural connotations is conducive to the stable development of greenways and the exchange and dissemination of cultural information. The networked layout of green corridors and the combination of lines and surfaces not only provide the general public with corresponding green infrastructure, but also increase public participation in cultural facilities and enhance the potential influence of cultural heritage sites in the form of dispersal. It can also establish a more systematic and comprehensive cultural, ecological, and leisure integrated protection pattern based on a larger space from the perspective of the city and region, and improve the cultural influence and affinity of the city. Therefore, networked green open space is not only a requirement for the continuity and integrity of the urban ecosystem, but also an
inevitable requirement for the pattern of urban cultural protection and development. In the process of constructing cultural landscape greenways, the layout of green open spaces should be closely centered on cultural heritage sites, connecting scattered cultural heritage sites, waterfront green spaces, residential areas, and commercial areas, and using linear green spaces as "Binder", forming a network system with greater cultural influence [6].

4.2. Environmental Mutual Penetration
Since ancient times, Chinese garden craftsmen have pursued the realm of "harmony between man and nature". The characteristic cultural heritage in the region should be "from nature to nature". When constructing cultural heritage nodes, attention should be paid to the natural integration of heritage sites with the surrounding environment such as plants, water bodies, topography, etc., to improve the "natural affinity" of cultural heritage, and achieve a coordinated pattern of cultural heritage and surrounding environment.

4.3. Symbolic Memory
Symbols are commonly used design techniques in landscape design and are the carrier of information exchange between the public and gardens. Symbols in garden design usually take representative objects in the landscape such as water bodies, buildings, and heritage sites as carriers, and express specific connotations through artistic treatments such as refinement and abstraction. Landscape symbols should have two meanings: first, the signifier; second, the signified. Expressive symbols refer to elements that have expressive functions (showing rhythm, color, material, density, etc.) such as the shape, space, surface, and volume of the landscape, while the actual symbols of the landscape refer to the meaning expressed by these elements of the landscape. These two levels of meaning together constitute the function and meaning of the landscape element, both of which are indispensable and define the meaning of the landscape symbol [7]. Symbolic memory can reproduce many human and historical attractions or scenes that have disappeared, thereby enriching the city's history and culture and continuing the city's historical context [8].

5. Construction Strategy of Cultural Landscape Greenway Network in Suzhou, a Water Network City

5.1. Urban Macro Scale
Connect regional cultural and ecological patches to form a water-based network pattern. The landscape structure elements of the cultural landscape greenway network at the urban macro-scale level include the remaining heritage point, fragmented large-scale habitat patches, and the base of the water system corridor with the city as the background. The macro-scale ecological pattern of the Suzhou area is composed of the Beijing-Hangzhou Canal, Taihu Lake, Yangcheng Lake, Shihu Lake, Jinji Lake and other major river system lakes, Guangfu Nature Reserve, Qionglongshan Nature Reserve, and Taihu Wetland Reserve. The pattern formed by these key landscape elements and spaces is of great significance for maintaining and controlling the development of ecological culture in the entire urban area.

5.2. Urban Meso Scale
Pay attention to river improvement and planning. Improve the ecological and cultural function of river corridors. The construction of a mesoscale cultural landscape greenway network needs to be combined with the planning of the river to gradually restore the comprehensive functions of the river and give play to the cultural and ecological value of the greenway. At present, many rivers or lake shorelines in Suzhou have been artificially channeled or cut off, and some sections of rivers have even become "broken-headed rivers" or culverts, which reduces the river’s ecological regulation ability. The landscape along the route is also singular, losing the regional cultural characteristics.

The Beijing-Hangzhou Grand Canal Corridor is one of the most important river corridors in
Suzhou, carrying multiple urban functions such as cultural dissemination, transportation, and flood control.

The construction of cultural landscape greenway should firstly carry out ecological restoration along the existing damaged section of the Beijing-Hangzhou Grand Canal, and combine the construction of greenway network to delineate the greenway buffer zone along the river to transition to the urban construction area, so that nature and the city can be organically integrated. And use the greenway buffer zone to connect the surrounding natural habitats such as Taihu Lake Wetland, Shihu Lake and Shanghangshan Forest Park. Secondly, use canal waterfront landscapes to connect cultural heritage sites (figure 1), enhance the continuity of cultural heritage, and integrate natural landscapes with regional culture to show the regional style.

Figure 1. Cultural Heritage Sites in Suzhou Section of Beijing-Hangzhou Grand Canal.

5.3. Urban Micro Scale
Combining the urban slow-moving system to improve the urban micro-climate environment and show the regional culture. The construction of the cultural greenway network at the micro level of the city mainly solves the microclimate environment of the city, shows the regional culture of the city, combines the construction of urban slow-moving systems and municipal public facilities, and connects community parks, street green spaces, urban parks, squares. Then, highlight the spatial and regional characteristics of cultural landscape greenway landscapes. Therefore, from the urban micro level, the following points should be paid attention to in the specific practice of greenways:
First, the materials for the construction of the greenway should be selected from the local vegetation tree species to form a nearly natural landscape configuration with a composite structure of trees, shrubs and grass. Under the condition of limited width, increase the diversity of greenway plants, reduce the temperature of the surrounding environment through plant transpiration, form water and land air ducts, increase the oxygen content of the surrounding air, and alleviate the urban heat island effect.

Secondly, combine the slow movement of the city Systematic unified planning to provide residents with a healthier and low-carbon travel. The paving materials should be made of local water-permeable stone or wood crushed stone and other recyclable materials, such as Jiangnan regional Wukang stone, bluestone, slabstone. These materials with high porosity can allow rainwater to penetrate into the underground to enhance the buffering effect of the greenway, and also have the effect of anti-skid on the ground. The use of gravel and waste wood to pave the ground to slow down the speed of cycling can play a certain safety Guaranteed. In addition, necessary landscape sketches and service facilities are set up to provide certain ecological services for citizens' recreation and travel (figure 2 and figure 3). The commonly used techniques of "borrowing scenery", "opposite scenery", "division of scenery", "separating scenery", and "changing scenery" and other techniques commonly used in Jiangnan gardens are used in these local landscape designs [9].
6. Conclusion and Discussion

The Jiangnan water network city has a characteristic water network spatial form and abundant natural resources. The construction of a cultural landscape greenway network can further promote the construction of urban green infrastructure, form an urban space of cultural and ecological green corridors, also can provide a good ecological and cultural pattern for the sustainable development of the city. The construction of a cultural landscape greenway network is a complex and long-term systematic project that not only requires theoretical support from different disciplines such as urban and rural planning, ecology, economics, and sociology, but also requires the collaboration of multiple government departments, and the extensive participation of enterprises and the public. The structure of cultural landscape corridors has different requirements and focuses at different scales, but the fundamental goal should be to protect historical culture and natural resources, improve the level of reuse, and develop local economy and leisure entertainment. Only by integrating the independent green spaces into a harmonious organic whole can the overall efficiency of the urban green space ecosystem be improved, the development of urban economy, society and ecological protection can be integrated and symbiotic, and sustainable and coordinated development can be realized.

References

[1] Ma Ch L, Ding J H 2015 Preliminary Study on the construction strategy of greenway network in water network cities [J] Heilongjiang Agricultural Sciences (03): 140-145.
[2] Yu Q, Wu B H, Liu Zh M, etc. 2007 A summary of scenic byway research and planning practice [J] Geographical Research 26(6):1274-1284.
[3] Tan K W 2006 A greenway network for Singapore [J] Landscape and Urban Planning 76 (1/2/3/4): 45-66.
[4] Xu W H 2005 Planning practice of ecological zhejiang province greenway network [J] Planner 21(5): 69-72.
[5] Xu H, Liao Z Q 2020 Research on route selection factors of guangdong province tour system——comparison of route selection of cultural heritage tour routes in Guangdong Greenway, Nanyue Ancient Post Road, Guangdong-Hong Kong-Macao Greater Bay Area [J] Urban and Rural Construction (17): 40-42.
[6] Zhang Q F 2002 Urban green network and its construction framework [J] Urban Planning Transactions (1):75-78.
[7] Deng W 2006 Perception of landscape: towards jingguan semiotics [J] Water Development Research (07): 47-50.
[8] Gao P 2013 Research on the Construction of Cultural Landscape Greenway in Hangzhou Section of Beijing-Hangzhou Grand Canal [D] Zhejiang Agriculture and Forestry University.
[9] Ding J H, Yang X H 2013 Analysis on the construction strategy of urban greenway network of water network based on ecological concept——taking Suzhou as an example [J] Modern City Studies 28(08): 104-108+115.