

Planning and Construction Strategies for Greenways Along the Suqian Grand Canal

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Abstract: The construction of greenway along Suqian Grand Canal is one of the important contents of the construction of greenway network system of Suqian City, which is "three rings, three lines, and one axis". This paper conducts a literature search, on-site investigation, and analyzes the advantages and disadvantages of the greenway construction along the Grand Canal in Suqian. Combining the cultural heritage resources and natural resources along different sections of the Grand Canal in Suqian, this paper carries out segmented feature positioning of the greenways along the Grand Canal in Suqian. It also proposes classification construction guidelines and optimization strategies for the greenway planning and construction along the Grand Canal in Suqian, so as to achieve the goal of turning the Grand Canal into a high-quality waterfront green corridor integrating culture, ecology, and tourism, and to promote the construction of ecological civilization and the sustainable development of Suqian.

Keywords: Suqian Section of the Grand Canal; Greenway Planning; Waterfront Landscape; Ecological Protection

1. Introduction

The Grand Canal is a representative symbol of the Chinese nation and an iconic symbol of Chinese civilization. In order to fully explore the rich historical and cultural resources of the Grand Canal, protect, pass on and utilize the valuable heritage of the Grand Canal ^[1], the "Outline of the Grand Canal Culture Protection, Inheritance and Utilization Plan" and the "Construction Plan of the Great Wall, the Grand Canal, and the Long March National Cultural Park" explicitly call for the "building of a green ecological Corridor", "improve the quality of shipping services", "promote

ecological protection and restoration", and "build a rapid transportation network on land and water" ^[2]. Therefore, the construction of the Grand Canal Cultural Belt requires the construction of ecological landscape protection forests from the ecological point of view, and the pollution prevention and control along the Grand Canal needs to be strengthened around the Grand Canal, and the integration of the historical and cultural construction of the Grand Canal and the Grand Canal Tourism Scenic Road planning and construction is required from the cultural and tourism point of view. Jiangsu Province issued the "Jiangsu Province Grand Canal Culture Protection, Inheritance and Utilization Implementation Plan", which proposes to create a "high-grade cultural corridor, high-value ecological corridor, high-level tourism corridor" ^[3]. It can be seen that the construction of the Grand Canal cultural belt and the construction of urban green corridors are complementary and inseparable.

The greenway along the Grand Canal in Suqian not only carries the important responsibility of connecting the ecological landscape on both sides of the Grand Canal and improving the quality of life in the city, but also serves multiple functions, such as ecological protection, leisure and recreation, cultural demonstration, transportation assistance and economic development. The planning and construction of the greenway along the Grand Canal in Suqian is an important practice in the construction of urban ecological civilization, which is of great significance to the promotion of harmonious coexistence between human beings and nature.

2 Greenway

2.1 Concepts

Greenway is a kind of linear green open space, usually established along natural and artificial corridors such as riverbanks, stream valleys,

mountain ridges, scenic roads, etc., with landscaped recreational routes accessible to pedestrians and cyclists, connecting major parks, nature reserves, scenic spots, historical monuments, and urban and rural residential areas, etc. [4]. The urban greenway system is mainly composed of the original natural environment, artificial restoration environment and artificial creation system, such as the plant communities, biological resources, soil, water and other natural elements of the city's green base; the slow-moving system with urban public service functions, transportation connection system, service facilities system and signage system. The linear character of greenway makes it have the role of connecting other green areas and neighboring places in the city, and the construction of urban greenway network can make the natural ecological pattern of the city have integrity and systematicity. Under the guidance of Suqian City Greenway Plan, Suqian City comprehensively promotes the construction of "five ecological corridors", integrates urban cultural elements into the urban greenway system, gives full play to the comprehensive performance of the city's ecology, culture and tourism trinity, lays a solid foundation for Suqian City to build a new pattern of ecological civilization, livability and livability, and promotes the sustainable development of Suqian City. Sustainable development of Suqian City.

2.2 Role

As a linear development landscape with strong practicality and landscape tandem, the greenway is characterized by place space openness, ecological diversity, capacity benefit and safety and practicality [5]. The main functions of greenway construction along the Suqian Grand Canal include (1) improving the ecosystem. By constructing ecological corridors, it maintains biodiversity, increases the continuity of urban landscapes and patches, and eases the pressure of urbanization on the natural environment, thus forming a complete and systematic ecological pattern. (2) Improve the quality of life. As an important carrier of leisure and recreation, greenways provide public space for citizens to get close to nature, fitness and recreation, and promote residents' physical and mental health; (3) Inherit history and culture. The greenway also carries the function of cultural inheritance and education, and the

combination of historical and cultural relics and natural landscape along the route has become an important window for displaying local characteristics and popularizing ecological knowledge. (4) Promote economic development. Greenways also play a positive role in promoting regional economic development, by attracting tourists and driving the surrounding industries, it becomes an effective way to promote green economy and realize sustainable development.

3 Current Situation of Greenway Construction Along the Suqian Grand Canal

The Suqian section of the Grand Canal is about 112 kilometers long, and the status quo along its route is rich and colorful, carrying a thick history and culture as well as displaying vigorous ecological vitality. The Grand Canal passes through the city, not only connecting the north and south of the city, but also promoting the economic development and cultural exchanges of the coastal areas. For Suqian people, the canal culture is actually the city culture of Suqian, the spirit of the canal is also essentially the city spirit of Suqian, taking into account the regional cultural characteristics and the overall cultural positioning of the region [6], must further enhance the position, broaden the vision, and take the initiative to docking into the construction of the Grand Canal Cultural Belt.

Currently, urban construction along the Suqian Grand Canal has achieved remarkable results, with ecological restoration and cultural and leisure development going hand in hand. The Suqian section of the Grand Canal, as the "urban ecological pulse" of Suqian City, has ecological and ornamental ecological corridors on both sides [7], forming a number of ecological wetland reserves and water conservation forests. Along the distribution of a number of historical sites, such as the Soap River Longwang Temple Palace, Qianlong Royal Pier, etc., these ancient buildings are not only the treasures of cultural heritage, but also an important attraction for urban tourism. The construction of cultural parks along both sides of the canal, such as the Dongguankou Park, the Central Canal Scenic Belt, and the Canal Bay Ecological Park, provides Suqian citizens with cultural and leisure venues that can be sensed, experienced, and can increase their cultural confidence and pride in the region.

However, while the city is developing rapidly, it is also facing some challenges. (1) Some areas along the canal are facing ecological degradation and environmental pollution, and the original biological habitats have been destroyed, affecting the virtuous cycle of biodiversity; (2) The Grand Canal, as an important carrier of Suqian's history and culture, preserves numerous historical sites and ancient buildings along the route, and these cultural heritages not only testify to the history, but also are an important part of the city's cultural soft power. There are still some historical sites facing the risk of destruction due to their age and inadequate protection. (3) Urban construction along the Grand Canal is still characterized by unbalanced development. Some areas have perfect infrastructure and greenway construction is taking shape, while some areas are lagging behind, lack systematic planning and effective management, and have problems such as landscape fragmentation, which affects the coordination and unity of the overall landscape. (4) The balance between ecological protection and tourism development during the construction of greenways along the Grand Canal is also one of the problems to be solved.

In summary, the current situation along the Grand Canal in Suqian shows rich natural and cultural resources, but also faces challenges such as ecological degradation, insufficient cultural protection and unbalanced urban development. Therefore, scientific and reasonable greenway planning and construction strategies are particularly important, aiming to realize the sustainable development and ecological balance along the Grand Canal.

4 Optimization Strategies for Greenway Planning and Construction Along the Suqian Grand Canal

4.1 Classification and Construction Guidelines for Greenways Along the Grand Canal

The resource elements that make up the landscape along the canal mainly include: river landscape, green landscape, historical buildings, coastal landscape facilities, regional topography and geomorphology, etc. From the point of view of emphasizing the differences in the construction of the greenway, the greenway along the Suqian section of the Grand Canal is

divided into segments for the characteristics of the positioning as follows: waterfront style, mountainous forests and wildlife, historical and cultural, urban recreation, and eco-corridor type. (1) Waterfront Style Relying on the natural water bodies and wetland landscape resources along the Grand Canal, it integrates them and builds waterfront embankments, trestles, slow walking systems, etc. to provide residents with daily leisure and recreational places. In addition, activities such as waterfront walkways, wedding photography, leisure fishing, and silhouettes of canal wetland mudflats can be planned to extend the Grand Canal tourism industry chain.

(2) Mountain and Forest Wild Interest Relying on good vegetation resources and rich plant communities along the Grand Canal, its construction can be developed in the direction of natural science popularization, ecological health, urban greening and natural conservation area, allowing Suqian citizens to experience the seasonal changes of natural plants throughout the year and the ecological greenway with the function of stress relief and recuperation.

(3) Historical and Cultural Relying on the historical and cultural sites along the Grand Canal, such as the Dongguankou Cultural Park, to provide a recreational area for the neighboring residents after meals and during festivals and holidays, the activities planned for this greenway can mainly include artistic creation, walking and shopping, dancing at sunset, Chudian culture, and parent-child play.

(4) Urban Recreational Relying on the surrounding lots along the Grand Canal that are mostly residential land, such as the Qiaotou Park near Suqian Bridge and the Canal Bay Park, etc., the greenway along the Grand Canal connects urban transportation, facilitates residents' green travel, improves the living environment and provides residents with outdoor recreation places, combining urban humanity and natural scenery.

(5) Eco-corridor type Relying on the farmland resources around the suburban areas along the Grand Canal, it will create an urban eco-corridor and a greenway to meet the needs of urban residents for countryside tourism. The main planning activities include countryside leisure, agricultural picking, ecological green corridors, folklore performances and lodging experiences.

4.2 Greenway Design Strategies Along the Grand Canal

Greenways are built based on public spaces such as mountains, forests, green spaces, waters, protective green spaces, urban parks and roads; therefore, greenways are a public resource, and maintaining their public attributes is the core value. From the existing resources along the Grand Canal: existing development and construction of green space, the nature of the surrounding land, traffic conditions, human history, visual quality, etc., and combined with the long-term goal of the entire greenway along the Grand Canal, the main design strategies are: (1) Planning implementation paths and integrating fragmented spaces

The construction of the greenway along the Grand Canal needs to be connected with the legal urban planning content, coordinate with other spatial planning of the cities along the canal, integrate the surrounding resources, pay attention to the integration of the greenway with the surrounding urban space, and regard the undeveloped scattered plots of land in the city and the longer lots on the outskirts of the city as a complete system for classifying and segmenting the planning and designing, so as to ensure that the construction of greenways along the Grand Canal is implemented through the control of the superior planning.

(2) Selection of routes based on natural veins, ecological priority layout

Integrate and restore the natural resources and ecological landscape along the canal^[8], closely rely on the natural veins of the Grand Canal, ensure that the greenway route is coordinated with the direction of the canal, give full consideration to ecological protection and historical and cultural inheritance, avoid ecologically sensitive areas as much as possible, and form a coherent and rhythmic landscape zone.

The layout follows the principle of "people-oriented and ecological priority", and rationally sets the width of the greenway and the way of access by taking into account the topography and hydrological conditions. For key nodes, such as bridges and piers, innovative design techniques, such as trestles and pontoons, have been adopted to create a pleasant walking and cycling environment and to ensure the coherence and safety of the greenway.

(3) Improvement of landscape quality and quality of life

Respect and protect the natural landscape resources along the route, incorporate historical and cultural elements, tell the historical story of the Grand Canal through sculptures, landscape vignettes and other forms, guide tourists to experience, perceive and experience the culture in an integrated manner, and pass the kernel of the cultural spirit to every tourist at home and abroad^[9]; set up resting nodes, viewing platforms and barrier-free facilities to meet the recreational needs of different groups of people. In addition, it emphasizes the construction of ecological corridors, promotes the protection of biodiversity, and builds a green space where man and nature coexist harmoniously, so that the Suqian Grand Canal Greenway will become a bright business card of the city's ecological civilization.

(4) Establishment of a multi-level transportation facility network system

Transportation facilities planning is to ensure the accessibility, safety and comfort of the greenway. A multi-level transportation network is constructed, including walking paths, cycling paths and necessary connecting facilities. Walking paths are paved with non-slip and wear-resistant materials, and resting seats and viewing platforms are set up along the way to enhance visitors' experience. Bicycle paths pay attention to smoothness and signage systems to ensure the safety and smoothness of cyclists. In addition, a number of parking lots and bicycle rental points are planned to facilitate the entry and exit of visitors and green travel, forming a convenient and environmentally friendly greenway transportation system.

(5) Improvement of greenway supporting facilities and service system

The establishment of a comprehensive supporting facilities and services system including rest stations, viewing platforms, bicycle rental and return stations, environmentally friendly toilets and garbage collection stations ensures that visitors can enjoy the natural scenery while receiving convenient and comfortable services. In addition, an intelligent guide system is introduced to provide tourists with a full range of information services such as route planning, attraction introductions, safety warnings and other services through the APP or QR code scanning to increase the experience of tourists. To enhance the interactivity and education of the greenway, ecological interpretation boards

and cultural display areas can be set up to tell the historical stories of the Grand Canal and the natural ecological knowledge of the areas along the route, and promote the deep integration of culture and nature.

5. Conclusion

The construction of a greenway system along the Grand Canal area in Suqian City will not only help to improve the quality of the urban ecological environment, increase green space, and protect biodiversity; it can also effectively connect natural landscapes and humanistic relics along the route, promote the protection and inheritance of the Grand Canal culture, and provide citizens and tourists with an excellent platform to get close to nature and learn about the history of the Grand Canal. In addition, as a linear open space, the greenway can activate the development potential of the surrounding land, promote the development of green industries such as leisure tourism, recreation and fitness, and drive the transformation and upgrading of the regional economy. The construction of the greenway along the Grand Canal is of far-reaching significance, not only in improving the quality of the city and the residents' sense of well-being, but also in realizing the harmonious unity of the three major benefits of economy, society and environment, and laying a solid foundation for Suqian to build an ecological civilization and a new pattern of pleasant living and working conditions.

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References

- [1] Liu Fengmei, Wu Shuling, Li Lai. Research on the Integrated Development of Grand Canal Cultural Belt Construction and Rural Tourism under the Concept of Heritage Corridor. *Journal of Beihua Institute of Aerospace Industry*. 2024, 34 (01)
- [2] Tian Xiaoyun, Li Tianru. Overall Program for Green and Modern Shipping Comprehensive Improvement of Suqian Section of Beijing-Hangzhou Canal. *Residence*, 2022(04): 13-15.
- [3] Li Zipei, Zhang Yan. Drawing the future blueprint of Jiangsu Grand Canal's "beautiful central axis". *Xinhua Daily*, 2021-06-08.
- [4] Zhu Jiang, Gan Youjun, Deng Mulin, et al. Exploration of Greenway Planning and Design Methods Based on Urban Characteristics--Taking Quanzhou Greenway Master Plan as an Example. *Urban Era, Synergistic Planning-Proceedings of the 2013 China Urban Planning Annual Conference (04-Scenic Tourism Planning)*, 2013: 371-380.
- [5] Sun Guang, Li Shuo, Liu Y. The study of "greenway" planning and design strategy under the concept of low-impact development Research on "Greenway" Planning and Design Strategies under the Concept of Low Impact Development--Taking "Greenway" of Yangliuqing Section of Tianjin South Canal as an Example. *Art and Design (Theory)*, 2021, 2(06): 80-82.
- [6] Wu Xianxia. Research on Promoting the Construction of the Grand Canal Cultural Belt by Cultural and Tourism Integration. *Inner Mongolia Science and Economy*. 2024 (03)
- [7] Wang Yueli, Duan Weiguo. Exploration on the Construction of Waterfront Greenway of the Grand Canal--Taking the Central Canal Section of Suqian City as an Example. *Future City Design and Operation. Research Center for Urban Design and Operation*, 2023(10): 35-37.
- [8] Wang Shujuan. Revitalization Utilization Mode and Development Strategy of Beijing-Hangzhou Grand Canal Historical Relics. *Journal of Tangshan Normal College*. 2020, 42(06): 121-125+147.
- [9] Yan Lin, Dong Beifei. From "Cultural Exploration" to "Cultural Experience": The Formation Mechanism and Educational Path of Cultural Identity. *Global Education Prospects*. 2023, 52(01) The role of cultural identity in education.