

Excavation and Future Direction of Cultural Architecture and Elements from the Perspective of Canal Culture

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Abstract

The article takes the cultural architecture and landscape under the Chinese Grand Canal system as the research object, and the core is to deeply explore the cultural connotation under the Grand Canal system and its connection with 'real space'. Through questionnaires, comparative analysis of examples, field visits and other means to summarize common problems, in-depth analysis of specific protection methods and potential challenges. Finally, the results of this study are extended to policy recommendations to further promote the protection, inheritance and utilization of historical relics in the canal system.

The main contents of this paper are as follows: the characteristics of cultural space from the perspective of canal culture, the similarities and differences between the north and south canal culture in China, the questionnaire survey for tourists, from the aspects of building type and satisfaction evaluation to understand the value of cultural architecture and cultural elements to culture itself. Finally, based on the above analysis, taking Xinyu Village in Linping District, Hangzhou City, Zhejiang Province and three other world heritage canals as examples, this paper further explores the possible direction of canal culture in the future, and puts forward feasible countermeasures for the management of the whole canal system.

Keywords: The World Heritage Canals, Cultural Landscape, Visitor Perception, Geographical, Water Environmental Management, Policy Proposal

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I. Three key words

The first keyword '**Grand Canal**' refers specifically to the '**Grand Canal of China**', which has been inscribed on the World Cultural Heritage List [1, 2, 3]. It is the general name of Beijing-Hangzhou Canal, Sui-Tang Canal and Zhedong Canal. It has both main veins and tributaries, as well as some trickling streams. It is a universal phenomenon that urban and rural human settlements '*live by water*' and many cities have '*mother river*'. There are various ways to relate urban and rural spaces to water, such as waterfront, near water and water-friendly etc.

The second keyword are '**Culture**'. The Grand Canal is not only a major artery for north-south transportation in China, but also an important carrier for the spread of Chinese civilization. It has effectively promoted cultural exchange and mutual appreciation in different regions[4,5]. As the saying goes, '*One side of the land raises one side of the people*'. The Grand Canal had a great impact on the development and evolution of culture and art, opera and music, customs and rituals, food, clothing, housing and lifestyle in the region through which it flowed and gradually formed a unique Grand Canal culture system. The culture nurtured by the canal and the linear area through which it flows is both part of traditional Chinese culture and one of the genes that have shaped Chinese culture[6,7,8].

The third keywords are '**Real Space**'. It refers to a real site with physical spatial properties related to the Grand Canal culture, not a site that is boundless and difficult to define physical boundaries. Also of strong relevance to the Grand Canal water system are water conservancy projects, hydraulic facilities, bridges and piers, and historical, cultural and architectural heritage of cities and towns along the route, such as the three bays of the Yangzhou section of the Grand Canal, in the past it used to slow down the speed of water flow by using the river to change the bend growth to resist the high potential energy of water flow[9,10]. At the same time, buildings and facilities such as Gao Min Temple, Wen Feng Pagoda, and local assembly halls were continuously

built and preserved along the canal and its surrounding space from the Gua Zhou Ferry of the Yangtze River to the ancient city of Yangzhou. In a word, the real space is the actual physical space, not the subjective imaginary space[11,12,13].

Based on the above premise, the article further analyzes the common approaches to implement ‘*Canal Culture*’ in the shaping of physical space, and stimulates the potential for canal culture for its nurturing function, contemporary regeneration and future innovation.

1. Characteristics of Cultural Space in the Perspective of Canal Culture

The pattern of towns along the canal is diverse, with different types of cultural elements derived from different spatial scales. In addition to the above-mentioned water projects, there are also the most common traditional settlements, public buildings and landscape structures[14,15,16]. Through field research, the following characteristics were summarized.

- ***Flexible distribution of riverine settlements of the river axis***

As the main body of cultural buildings, it is more difficult for the street space to overcome the common problems such as the lack of vitality of the space behind the river or away from the river, the difficulty of forming a system with scattered distribution and the lack of cultural atmosphere. ***Flexible distribution*** refers to the distribution of points, strips or groups along the river, supplemented by landscapes, nodal activity spaces, iconic structures or buildings as a way to relieve visitors' fatigue[17]. It makes the space scattered in form but not in spirit, softening the pause of the building through the articulation of material space or in spirit[18,19,20,21].

- ***Public buildings focus on dialogue between ancient and modern***

The Sui Tang Grand Canal Culture Museum and the OCT Jining Grand Canal Culture & Art Center, for example, are closely focused on the clear subject of canal culture, and therefore have distinct regional qualities. **(Figure 1)** [22] The former takes the arch bridge structure erected over the Luo River as the prototype, and replaces the figurative imitation of traditional styles with the natural presentation of modern construction techniques, thus realizing the dialogue between ancient and modern civilizations. **(Figure 2)** [23] The latter responds to the ‘the deceased is like water’ with its “flowing” shape, integrating the building into its environment and serving as a good transition to the watery mechanism and the urban fabric.

Figure 1.



Note: Rurban Studio, TJAD.Sui-Tang Dynasties Grand Canal Cultural Museum. Architectural Practice. 2023,(02):92-100.

Figure 2.



Note:CCTN Architectural Design Co., Ltd. Oct Jining Grand Canal Culture & Art Center. Architectural Practice. 2023,(02):92-100.

● **Landscape architecture using appropriate spatial scale**

Thousands of years of canals have nurtured many cultures such as farming and weaving. The preservation and addition of landscape sketches and a series of cultural elements to enhance the cultural atmosphere of the canal. Through a profound understanding of nature, culture and design, the designer draws on symbols such as the Grand Canal and old buildings and expresses them in modern art, interpreting an oriental aesthetic view. Structure that pay more attention to spatial scale of this process are more likely to stand out. For example, some landscape structures not only focus on human ‘standing’ and ‘sitting’ needs but also ‘lying’ and ‘playing’ needs. This kind of structures of the target group psychological needs and behavioral needs of in-depth consideration of the visitor satisfaction is relatively higher[24,25,26,27].

2. Canal Culture Comparison between North and South

The Beijing-Hangzhou Canal runs from north to south. Taking Beijing and Zhejiang as examples, it is easy to see that there are commonalities in the protection for the Grand Canal, butalso certain differences due to regional and historical reasons.Observing the *Five-Year Action Plan for the Protection and Heritage Utilization of the Grand Canal Culture in Beijing (2018-2022)* and the *Implementation Plan for the Protection and Heritage Utilization of the Grand Canal Culture in Zhejiang Province*, proposed successively in 2019 and 2020[28,29,30], the following similarities and differences are summarized.Canal Culture North-South Comparison is shown in **Table 1**.[31]

Table 1.

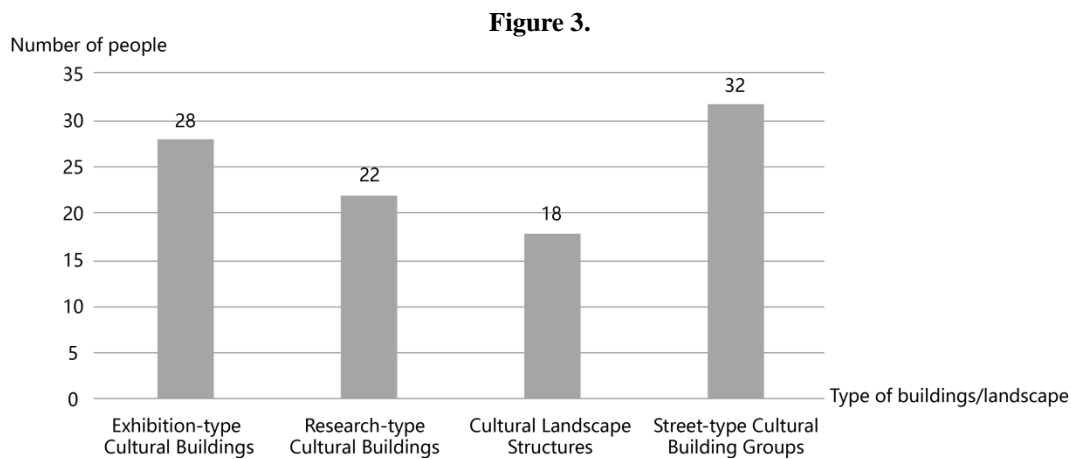
Region	Similarities	Differences
North	In the protection for cultural relics, ecological, restoration cultural preservation heritage utilization. cultural tourism combined with the synergistic development of five aspects of the requirements, and to strengthen the heritage of the canal culture protection in the first place.	<ul style="list-style-type: none"> ● Because of the difference in natural resources, the north and south ecological green belts is slightly different ● Special emphasis was placed on monitoring along the Canal
South		<ul style="list-style-type: none"> ● The economic link with the transformation and upgrading of canal shipping and the connection to “One Belt One Road” ● Because water transport occupies an important position in the south, more attention is paid to the transformation and upgrading of canal shipping
Example	<ul style="list-style-type: none"> ● Cultural relics: North - vacate cultural relicsbuildings around ShichahaiSouth - proposed canal cultural heritageprotection project and canal non-heritage protection heritage project ● Ecology: North - through the North Canal and other 6 greenway South - proposed canal ecologicalenvironmental protection project ● Tourism: North-build the first 5 A scenic spot on the east of Beiing South - proposed the canal city and town upgrading project and the canal culturaltourism integration development project 	North - Proposed one river; two roads, three areas’ development pattern South - Build a spatial pattern of one corridor, two pieces, multiple groups` and multiple lines

Note: Canal Culture North-South Comparison.

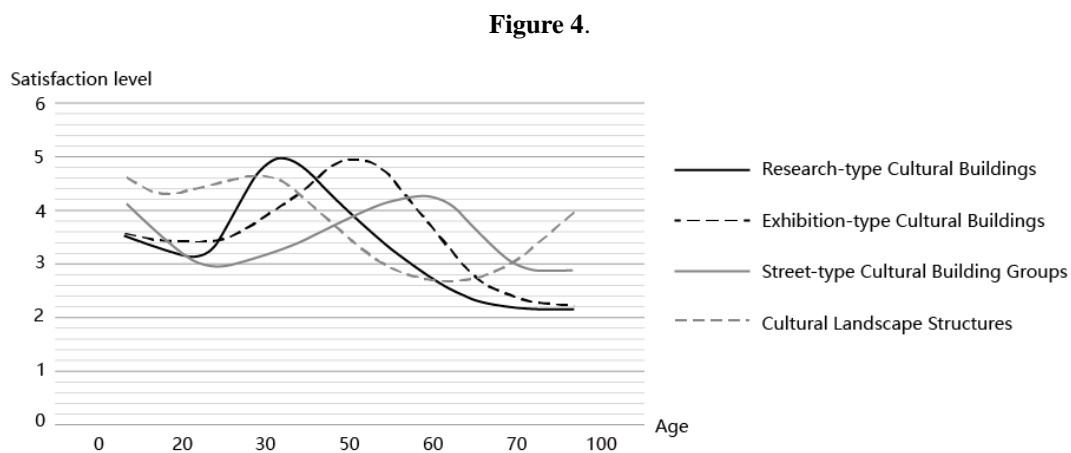
Predict blue ocean: provide innovative ideas about river remediation and ecological restoration, renovation and upgrading of architectural and cultural relics, creating IP for cultural tourism industry, adding ornamental features of the Grand Canal through cultural innovation, and building a special museum system.[32]

3. Exploring the long-term development of canal cultural space based on tourists' questionnaires

Through the analysis of the questionnaire results of 100 visitors to four types of spatial patterns of the canal water system: exhibition-type cultural buildings, study-type cultural buildings, cultural landscape structures, and street and alley-type cultural building groups. The street and alley-type cultural building groups is the most popular among visitors, and visitors are most willing to stay in them, implying that the protection and development of street and alley spaces has great values. Although the research space has public attributes and the construction cost is no less than that of exhibition-type cultural buildings, it has higher economic benefits and educational value. Number of People Most Willing at the Location is shown in **Figure 3**. Visitor Satisfaction and Age Correlation Curve is shown in **Figure 4**.[33,34]



Note: Number of People Most Willing to Stay at the Location



Note: Visitor Satisfaction and Age Correlation Curve






4. The possibility of deep cultivation of canal culture in the future - Taking four world heritage canals as an example

● **Regional¹ expression as an important design tool for cultural architecture**

Due to the differences in locality, ethnicity, environment and culture, architecture has an obvious and sustainable cultural specificity[35]. As they interact with each other, the specificity of architecture seems to diminish. The importance of this topic is constantly argued, from the many new construction, renovation and restoration projects in China in recent years to the different expressions of the Pritzker Prize winners abroad on locality. Respect for regional culture is one of the tenets of cultural architecture. At the same time, 'Culture' is widely used as an important element of regional expression. Adaptation and use of terrain and climate; combination of modern architecture and traditional cultural elements; technical "appropriateness" based on demand; ecological and economic building materials and other innovations are the breakthrough point of

regional architecture. Five cases of regional expression are shown in Table 2, which compares and analyzes the cooperation of their expression methods.

Table 2.

Title	Geographical Approach	Effects	Building Pictures
Phoenix Valley Hilltop Art Gallery	Topography: follow the mountain, follow the trend, connect with the mountain and water, and integrate with nature	It will not only reduce the damage to the local environment, but will also better integrate into the local environment.	
MuLanWeiChang	Climate: morphology extracted from yurts, also locally sourced	It will not only reduce the damage to the local environment, but will also better integrate into the local environment	
Hangzhou Fuyang Dongziguan Relocation Farmhouse	Culture: Extract, analyze and abstract the traditional double slope roof or single-slope roof	It will make a better combination of modern architecture and local traditional elements	
ZhuLi	Technology: Close integration of traditional construction techniques with prefabricated industrialization	Establishing the role and place of technology in architecture in a site-specific manner	
Shuangxi Academy	Material: the main body of the building is built with bamboo steel	Make full use of the advantages of bamboo steel such as high strength, high density flame retardant low carbon, easy to process and recyclable	

Note: Geographical Expression Instance Analysis

● **New ways to boost canal culture, including special studies**

As a research industry with high tourist satisfaction, the main development method is to combine industry, academia and research, which has cultural benefits, economic benefits and educational significance. Deeply cultivate local research resources and develop towards aspects closely related to canal culture, such as green agriculture. Retain foreign tourists and promote the linkage effect of local industries at the same time.

● **New technologies energize canal culture**

The development of canal culture should combine two dimensions: historical culture and real needs. For example, in Xinyu Village, Linping District, Hangzhou City, Zhejiang Province, the canal as its main water system has given birth to a long local farming culture. The demonstration farm of ecological efficient agriculture in the village : Li Bobo family farm is shown in **Figure 5**.

Figure 5.



Note: Netflix Farm: Uncle Lee Family Farm

Through field research, we learned that the village is centered on the main line of work of the 'the Issues Related with Agriculture, Farmer and Rural Area', based on the village's lotus, fruit lotus, snapper and other advantageous resources, vigorously developing ecological and efficient agriculture, and actively linking the surrounding resources. The government has plans to transform an old factory building into a landmark agricultural research base, which is currently being tender. A series of biological control and sewage purification measures have been adopted in the village, as **Figure 6,7**.

Figure 6.



Note: Biological Control of Fucus Snails

Figure 7.



Note: River Water Purification Device - Ecological Floating Island

Drawing on the **ecological model of mulberry fish ponds²** in the middle and lower reaches of the Yangtze River, the company is developing towards the "whole industry chain model of lotus ponds". The ponds are used for black fish farming and produce a series of deep processing products such as lotus seeds, lotus roots, lotus hearts, lotus root powder and lotus leaf tea. At the same time, phytoplankton can play a role in purifying water quality. In the future, if the canal culture is further explored, supplemented by lotus pond ecological treatment technology and green agricultural development technology, a sustainable development of the road to prosperity can be foreseen.

In terms of engineering design, we can refer to the design scheme of urban water environment ecological treatment project of Xinyutang[36], from the perspectives of bioaugmentation purification, ecological

re-oxygenation-pumping fountain aeration, local aquatic plant community construction-ecological floating island, aquatic plant ecology construction and so on.

- **Other world-wide heritage canal classic cases**

This paper also selects the Medi Canal in France, the Rideau Canal in Canada and the Pontquisit Water Bridge and Canal in the United Kingdom as examples to explore the experience in enhancing the protection, inheritance and utilization of canal culture, natural heritage and intangible cultural heritage.

The Midi Canal in France, also known as the Double Sea Canal or the South Canal, was built between 1667 and 1694. It is a canal connecting the Caron River and the Mediterranean Sea in southern France.[37] Its designer is Pierre-Paul Riquet. The outstanding feature of the canal is the bold and innovative design, which integrates the canal development with the surrounding environmental protection by using the latest technology, creating a civil engineering miracle, greatly promoting the development of science and technology, and laying the foundation for the French industrial revolution. [38]

Similarly, according to the data of the Canadian Park Service, the Rideau Canal was designed and supervised by John By. It was built from 1826 to 1832, starting from Ottawa, the capital of Canada, to the south of Kingston Harbor on Lake Ontario. The total length is 202 kilometers, of which 19 kilometers are artificial canals. The whole canal consists of rivers, lakes, artificial canals and locks. The construction of the canal used the advanced European still water system, *slackwater system*, at that time, that is, through the construction of high dams, the water level was raised, and the rapids and shoals in the natural river were submerged to accommodate the navigation of larger steam-powered ships, which provided a relatively safe material transportation route for the British colonies in Canada at that time. [39] It is worth mentioning that he has effectively transformed its functions and roles many times, and successfully launched the Lido Cultural Heritage Corridor Ecotourism Project.[40]

Finally, according to the British government's report, British Pontcysyllte Aqueduct & Canal was built in 1795-1808, from Horseshoe Falls in Retham, Wales, to Glead, Denbey, England, with a total length of 18 kilometers. It is the longest and highest elevated waterway in Britain. By resolving the side effects of industrialization and urbanization, the canal has made great contributions to the transportation demand and economic take-off during the British Industrial Revolution. [41]

- **Discussions and policy proposal**

The World Heritage Canal mentioned above has indeed set an example for other canals in terms of protection, inheritance and utilization through legislation. It also provides the following valuable experience :

1. Actively play the role of government guidance and coordination of urban planning. In its protection and management, three of the world's canals have an authoritative governing body in the complex relationship of multisectoral management. For example, the Medi Canal has the French Waterway Authority (VNF), and the Canadian Heritage Department leads a joint agency that includes the Canadian Parks Authority, four Canadian museums, the National Archives of Canada, and the National Library of Canada. They are relatively independent of the national management system. Public institutions, with relative authority, guidance, and flexibility in economy and management, can effectively manage the conservation system of heritage and landscapes, while also fairly coordinating the complex relationships between different departments. Similarly, the construction of the Grand Canal in China also pays more attention to shared development, and integrates the concept of " universal sharing, comprehensive sharing, co-construction and sharing, and gradual sharing " into the coordinated construction of the Grand Canal cultural belt.[42,43,44,45]

2. Maintain the canal and other cultural heritage in the form of decrees. The above cases are trying to establish a sound legal system and a clear responsibility management system. For example, the French Midi Canal has a series of rules and regulations on engineering and management, which are issued to grass-roots units to make the protection and management of the canal rule-based. [46]

3. Finally, strictly in accordance with the law, properly handle the relationship between protection, inheritance and utilization. Relatively speaking, the four canals selected above have a long history and sound laws and regulations, but their most worth learning experience is to follow the law and act according to the law. In the process of transforming its functions and roles in line with the times and places, the four heritage canals, on the one hand, strictly control the UNESCO's regulations on sustainable development, on the other hand, through overall planning, while moderately developing the canal tourism, pay attention to the promotion of related industries in the surrounding areas, and adjust measures to local conditions.

4. Vigorously develop cultural derivative industries and brand activities. Cities along the Grand Canal in China should comprehensively and systematically excavate and sort out cultural resources such as historical and cultural relics, ancient literature and historical archives ; through scientific and technological means and enhance the sense of cultural experience, so that the cultural and museum attractions along the " live " up, " fire " up.[42,47]

5. Prudent protective development of tourism resources. On the premise of not destroying the canal heritage and the ecological environment of the canal, cities along the Grand Canal in China can vigorously develop the 'deep tour of the canal'. Taking 'water' as the chain and 'scenery' as the point, the ancient city and the ancient town are connected in series, the cultural folklore and the tourism products are integrated, the humanistic elements and the natural elements complement each other, and the scenic spots are combined with the interactive experience to meet the multi-level and multi-faceted needs of tourists, enhance the attraction and appeal of the canal culture to tourists, and form a new pattern of deep tourism development in which sightseeing tourism, leisure vacation and cultural experience are mutually integrated and mutually promoted.[42,48,49]

However, there are still many weak links in the restoration of the Grand Canal, and the challenges are : the coordination of industry and ecology, the coordination of culture and ecology. How to implement the concept of green development, not to cause new pollution problems ; how to stick to the bottom line of cultural heritage protection, not to over-develop, and how to reasonably supervise and strengthen pollution prevention and control measures.[50,51]

II. Conclusions

Canal history and cultural heritage is the concept of the time axis, the canal is the concept of the spatial axis. Discovering the cultural value and charm of the Grand Canal and inheriting the city's memory can promote modern economic development on the one hand, and benefit people's lives on the other, finding balance and resonance between the two. The residual heat of the canal culture in the above aspects is enough to light up life, activate the environment, empower development and create the future, and its more value is worth further exploration.

Acknowledgments

1 Regional architecture: architecture that responds to the topography, topography, climate and other natural environment of a certain region, as well as the lifestyle, cultural customs, religious beliefs and other human environment and meets the local economic and technical conditions.

2 Mulberry-based fishpond is an efficient artificial ecosystem created in the Pearl River Delta region of China to make full use of land. It is a deep fishpond, high base field, mulberry planting on the base of the pond, and fish farming in the pond.

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