

# Ecological Functions and Spatial Design of Entrance Waterscapes in Traditional Huizhou Settlements: A Case Study of the Shuikou Area in Chengkan Village

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**Abstract:** This study explores the ecological functions and spatial composition of the water landscape in the traditional Huizhou settlement of Chengkan Village. The analysis reveals how the estuary integrates the functions of water source protection, microclimate regulation, and cultural expression through a complex layout of ponds and Feng Shui forests. It provides important lessons for modern sustainable landscape design and planning.

**Keywords:** Huizhou waterscape; Ecological function; Spatial design

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## 1. Introduction

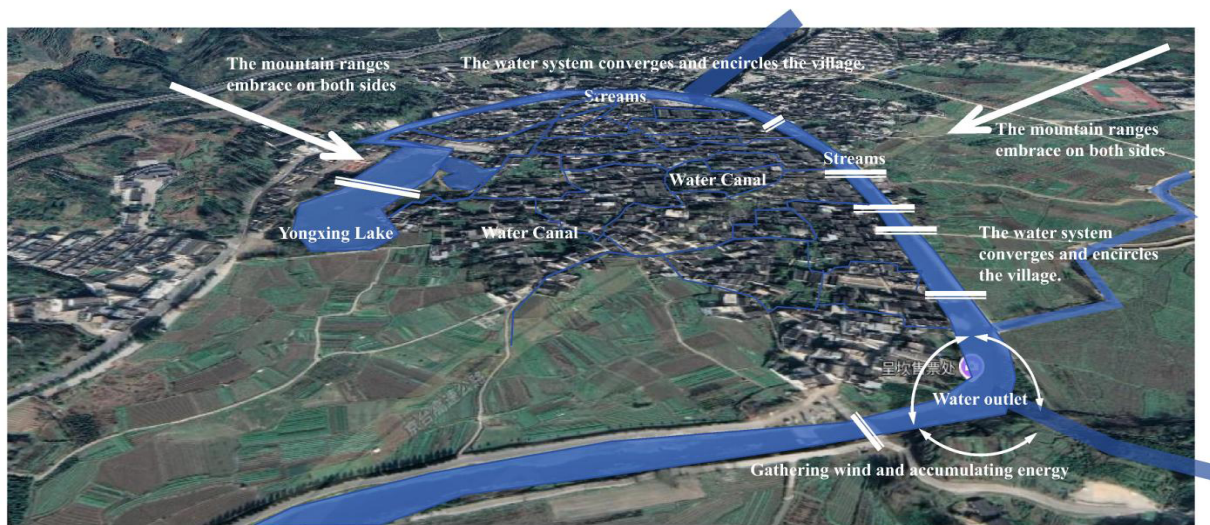
Water features are a functional part of traditional settlements and a lifeline that sustains the natural environment and cultural spirit of the village. Key elements such as water gates, flowing waterways, village ponds, such as moon ponds, and surrounding streams form a multi-layered system for managing water flow, creating a harmonious balance between environmental sustainability, daily practicality, and cultural expression. This paper takes the water mouth of Chengkan Village as a case study to explore its role in ecological regulation and its spatial expression, to uncover the wisdom of traditional practices and offer insights for modern water landscape design and sustainable landscape planning.

## 2. Gathering water to form a village: An overview of the spatial pattern and water environment of Chengkan

### 2.1. Village location and overall layout

The traditional Huizhou village layout is based on the ecological principle of ‘following the contours of land and

water to form a village', which is an homage that exists in harmony with the ecological environment, and natural topography and hydrology as shown in **Figure 1** <sup>[1]</sup>. In the mountainous area of southern Anhui Province, various villages empower a favorable village in a gentle location surrounded by mountains and water in the valley and riverbank, in the concept of avoiding natural disasters and utilizing water sources sustainably. Not only does it make efficient use of resources, but it also improves adaptability to the environment. Huizhou villages are generally designed with the pattern of 'low in front, high in back', where imported water from superior terrain runs through the village and is returned, forming an effective water diversion-use-drainage system. The water run system is a direct influence to the street type and building type configuration, and the streets will follow the shaped of the water run and the alleys will follow the shaped of the ditches. This, then depicts the sculpture of "running water in front of the house, cultivated land behind the house." <sup>[2]</sup>



**Figure 1.** Fengshui layout of Chengkan village source

## 2.2. The geographical location and overall composition of Chengkan Village

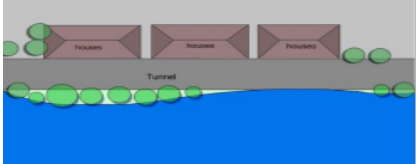
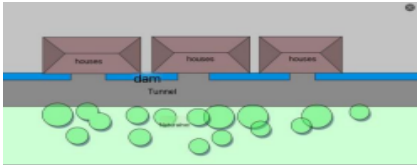
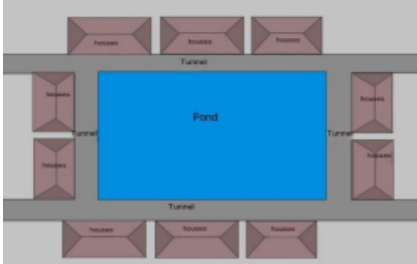
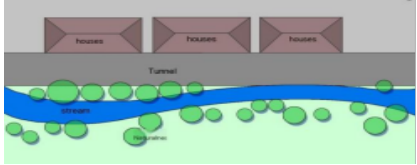
The layout of the Shuikou area in Chengkan Village shows basic Feng Shui ideas. It follows the belief of "blocking wind and keeping energy, treating water as wealth" (see **Figure 1**). The water inlet sits in a lower area near Yongxing Lake. It helps collect water and lowers the risk of flooding <sup>[3]</sup>. People have planned the Shuikou space carefully. They built things like bridges, temples, and Feng Shui stones. Yongxing Bridge goes over the water and gives villagers a way to walk across. It is also used during festivals and important events. Shuikou Temple is where villagers pray to the water god and honor their ancestors <sup>[1]</sup>. It connects their beliefs with daily life. The buildings around the water blend with the natural setting. This makes Shuikou a place that helps manage water, follows Feng Shui ideas, and shows local traditions.

## 2.3. Overview of the Shuikan Village water landscape

Chengkan Village has a well-planned water system. It includes water outlets, canals, ponds, and streams <sup>[2, 3]</sup>. Based on Table 1, the system begins at Yongxing Lake. This lake stores water and helps prevent floods. It also keeps the water supply stable <sup>[4]</sup>. Tall trees grow along the lake. They help block wind, keep moisture, and build a Feng Shui setting. These trees also add cultural meaning to the space. The irrigation ditches run beside streets and alleys. Some are open, and some are covered. They help with daily water use, farming, and flood prevention. Stone ditches and wooden gates are placed in smart ways. This helps manage water well and keeps the system working smoothly with nearby houses. Ponds are placed in important spots around the village. They store water, help stop

fires, cool the air, and are used during local events. These ponds are shaped like courtyards and often sit at the center of village life. They reflect the idea of “bringing people together with water.” Streams carry water out of the village. Their banks are lined with eco-friendly edges and water-loving plants. This helps stop flooding and keeps the water clean. The streams also create a smooth link between the village and the natural land around it.

**Table 1.** Spatial pattern table for water features

Elements	Spatial location	Main functions	Pattern diagram
Water outlet	Village entrance/exit	Water regulation, water supply and irrigation, feng shui blessing, cultural rituals	
Water canal	Distribution along streets and lanes	Diversion of water supply, flood control and drainage, shaping the village pattern	
Ponds	Village core	Water storage and regulation, fire protection, public event space	
Streams	Village boundaries	Water purification, flood control, hydropower, cultural support	

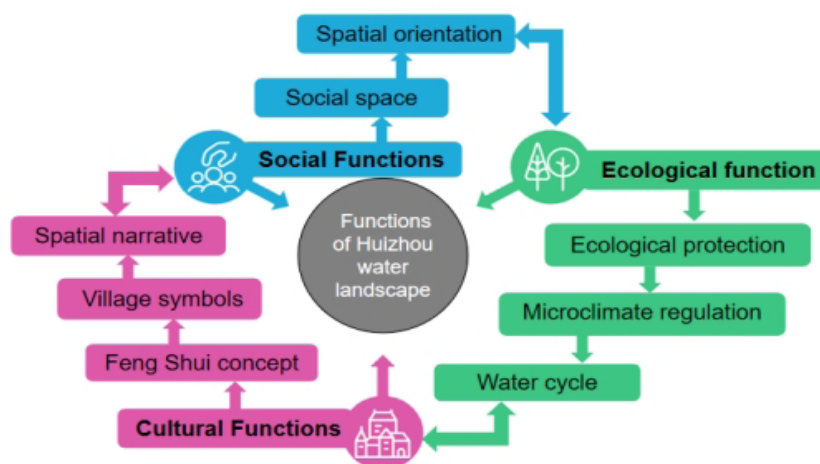
Yongxing Lake is the main source and storage place for the village’s water. It also helps to prevent flooding. Irrigation canals run along the streets and alleys. Some are open, and some are covered. Together, they provide water for daily use, farming, and flood control. The reservoir is set up to do many things. It holds water, helps put out fires, cools the air, and serves as a space for local events. Streams carry water out of the village. To protect the land, the banks are strengthened and planted with plants that grow well in wet soil. This helps stop floods and makes the water cleaner. It also creates a smooth area between the village and nature.

### 3. Symbiosis of water and environment: the ecological and cultural value of the water landscape in Huizhou

#### 3.1. Ecological functions

The water system in Chengkan Village uses the natural terrain to build a layered structure, as seen in **Figure 2**. Rainwater is collected and reused through a simple process: it is first stored in the water mouth, then guided through ditches, kept in ponds, and finally drained out by streams <sup>[5]</sup>. Also, the trees in the Feng Shui forest adds

moisture to the air, and water from ponds and streams slowly evaporates. These two processes help lower the temperature and keep the area humid. This helps keep the local environment stable and full of life.



**Figure 2.** Functional analysis of the water landscape

### 3.2. Cultural function

In the Chengkan Village ecosystem, the water environment is more than its role as a simple symbol of Feng Shui, it is also a medium for expressing the villagers' beliefs and cultural practices <sup>[3,5]</sup>. The area around the mouth of the water, including Yongxing Lake, a stone bridge, and a Feng Shui tablet, forms a Feng Shui arrangement that is reputed to “conceal the wind and gather the Qi.”

### 3.3. Social functions

The area around the water landscape is a hub of social and communal life for the villagers. The arrangement of the water system has had a profound impact on the development of streets and pathways, thereby establishing a spatial structure characterized by ‘water-shaped streets’. The impact reinforces the orientation and recognition of the village, thereby positioning the landscape of water as an interface between spatiality and social life, as seen in **Figure 2** above.

## 4. Inspiration and reference: The guiding significance of traditional water landscapes for modern planning

The water landscape design of traditional Huizhou villages provides a valuable reference point for contemporary urban and rural landscape planning. This is due to its ingenious use of topography, ecological priority principles, and deep cultural integration. Taking the water outlet system of Chengkan Village as an example, it is possible to see that its characteristics of displaying spatial layering and functional complexity have the potential to inspire contemporary landscape planning.

### 4.1. Create a hierarchical water system to optimize the spatial layout

The ‘water mouth - water ditch - pond - stream’ hierarchical system in Chengkan Village has been demonstrated to achieve effective scientific management of water resources and the harmonious unity of spatial order <sup>[5]</sup>. It is submitted that modern landscape planning can learn from this model and construct a water management system of



‘main water body - branch water network - wetland buffer zone’ to enhance ecological efficiency and the layering of the landscape.

#### **4.2. Strengthen the ecological concept and promote sustainable design**

Chengkan Village employs Feng Shui forests to safeguard water sources, ponds to regulate water volume, and wetlands to purify water quality, thereby establishing a closed ecological cycle. Contemporary urban design would be well-advised to take inspiration from this strategy of natural infiltration and minimal intervention, incorporating technologies such as rain gardens and permeable paving, and promoting the concept of sponge cities and the practice of low-impact development (LID).

#### **4.3. Enhance sense of place identity in the context of cultural background**

The water landscape in Chengkan Village is not merely a practical infrastructure, but also a space that carries spiritual culture <sup>[6]</sup>. Its cultural symbols and ritual paths provide a new paradigm for place-making in modern water landscape design. By incorporating local traditional elements and spatial narratives, the cultural connotations and humanistic care of the water landscape can be enhanced, thereby deepening the emotional connection and sense of place identity of users.

### **5. Conclusion**

The hydrological pattern of ‘water mouth - water ditch - pond - stream’ in Chengkan Village has created an ecological network whereby ‘a village is formed by water, with water as the pulse’. This research demonstrates the outstanding performance of the Huizhou water landscape in natural adaptability and systemic wholeness, and its broad integration into both the spatial structure and social organization of the village. The research highlights the need to establish a hierarchical water system that integrates ecological functions in the process of restoring cultural values in modern water landscape planning. Follow-up research must investigate adaptation strategies and transformation directions of traditional water landscapes under various environmental conditions with different data resources and methods, and field investigations, to provide both theoretical recommendations and practical recommendations for promoting an ecological civilization and invigorating local culture.

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### **Disclosure statement**

The authors declare no conflict of interest.

### **Author contributions**

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Case analysis and Writing: Yan Yu

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