Study on Urban River Ecological Landscape Design

Yangyang Liu1,2,3,4,*

1Shaanxi Provincial Land Engineering Construction Group Co.
2Ltd. Institute of Land Engineering and Technology, Shaanxi Provincial Land Engineering Construction Group Co., Ltd.
3Key Laboratory of Degraded and Unused Land Consolidation Engineering, the Ministry of Land and Resources.
4Shaanxi Provincial Land Consolidation Engineering Technology Research Center.

*Corresponding author e-mail: 953382789@qq.com

Abstract. The ecological design of urban rivers is an important part of the urban landscape planning and design system. However, the current urban rivers in China, the rivers are seriously polluted, the primary environment is destroyed, and the water bodies lose their self-purification ability, which not only affects the image of the city, but also threatens the health of the citizens. Therefore, we must pay attention to the environmental design of urban rivers. This article discusses the composition of the river landscape from a landscape perspective. With the increasing emphasis on environmental protection, people's demand for landscape is getting higher and higher. How to integrate humanistic concepts into design on the basis of ecology is also worthy of our consideration.

1. Introduction

Rivers are the source of life, the existence of water space, and the carrier of transportation, agriculture and business [1],[2]. The environment created by rivers has opened the historical picture of human development. When early ancestors chose settlements, they were generally close to rivers and lakes. This is not only because water is an indispensable condition for life, but also the basis for crop growth. Habitation is a prerequisite for human development.

Throughout the world's famous cities, they have been developed relying on rivers. Under the nourishment of river culture, they have given birth to a long history and culture. Urban rivers play a key role in the development of the city. The relationship between cities and rivers is getting closer and closer. The rational and scientific planning and development of urban rivers and waterfronts can not only promote the development of urban economy, but also significantly improve the urban Image and visibility [3].

At present, one of the main goals of ecological design for urban river channels in China is to improve the environment of rivers. Due to the rapid economic development of China in recent decades, the ecological environment has been greatly damaged [4]. A large amount of dirty industrial wastewater, domestic sewage, and garbage were stolen into urban rivers. The river's self-purification ability and sewage discharge capacity also gradually decreased. The surface water bodies of cities were polluted by different cities. At the same time, it also caused harm to the health of citizens. With the government's gradual emphasis on the ecological environment, in the river channel and riverfront
management and planning in various places, more and more attention is paid to the ecological role of rivers. In the design or reconstruction of rivers, ecology and water are combined, not only focusing on engineering. The protection of the native environment during the implementation, and the late treatment of the river environment has also been strengthened [5]. We can see from many cases of river channel design. The current planning and design is not only from the perspective of engineering, but also incorporates aesthetic, humanistic and ecological concepts into the design. For example, the reuse of sewage; strengthening the connection between urban water sources, enhancing the activity of river water sources; cleaning up river garbage, and returning to the surrounding native environment; increasing public facilities, and creating excellent Public environment, etc [6]. The landscape planning of urban river channels not only contributes to the development of the city, but also “cures” the urban rivers. This article considers and discusses the ecological restoration system, issues related to the design and transformation of river landscapes, creating a healthy ecological sustainable system for rivers, improving the resistance of various elements and the ability to restore the entire system, and finally discussing how to integrate into regional culture and humanities. Features. The comprehensively proposed related theories provide corresponding theoretical basis for further practical research.

2. Urban river channel type
The types of urban rivers are slowly formed according to the needs of urban development. According to the formation factors of river channels, river channels are classified into two types, namely natural river channels and artificial river channels. Natural river channels are formed under natural environment. Artificial river channels are constructed by manual intervention. Nowadays, river channels in cities are mostly artificial river channels. According to the function of river channels, river channels are divided into transit channels, shipping channels, moat channels and diversion and drainage channels. (Table 1).

| Classification | Flow   | Function                                                                 |
|----------------|--------|-------------------------------------------------------------------------|
| Transit river  | Large  | It is connected with other artificial channels and forms a water network, which meets a large amount of urban water intake and drainage, drives the city's economy and transportation, and forms a waterfront landscape environment. |
| Shipping river | Medium | Provide urban foreign trade transportation, drive urban economy, share urban drainage and drainage |
| Moat channel   | Small  | Provide urban drainage function, reflecting the history and culture of the city |
| Diversion channel | Small | Meet urban water and drainage, provide recreational waterfront environment, and improve the quality of life and image of urban residents |

3. Urban river landscape planning and layout
3.1. General principles
The general principles include early site surveys and adjustments, detailed records of river widths, water levels, and native environmental conditions of the river, such as surrounding buildings, plant species, and plant clusters. You also need to understand the topography and climatic characteristics of the city. After conducting a preliminary general survey, according to the overall concept of urban planning, and designing the theme of the river environment based on the characteristics of the external environment of the river, a planning theme can be defined for each river basin, with emphasis on the
key points. The choice of theme can be the culture of the river itself, or the characteristics of the space outside the river or the history and culture. Highlighting the key points can make a deep impression.

3.2. Regional Design Principles
Region is a combination of natural and human factors. Regional culture has given birth to different humanistic characteristics in a special natural geological background, and has formed its own unique cultural characteristics during its evolution throughout the year. At present, there is a high degree of similarity in urban river landscape design. Therefore, the design must not only consider engineering construction, but also pay attention to the cultural background of the city, maintain the original form of each region as much as possible, and integrate regional culture into the design. Only the "soul" of the urban river landscape can better show the cultural characteristics of the city.

3.3. Ecological Design Principles
On earth, no living thing can survive in isolation. There is a complex relationship between living organisms and the surrounding non-living environment and living environment. Living things also have different degrees of influence and interference on the environment on which humans depend. Activities, in order to achieve the needs, will cause varying degrees of damage to the nature on which we depend, and naturally cause ecological imbalances. As humans always improve the environment, the design must consider the protection of the natural environment, protect the flow of rivers and rivers, ensure the normal survival of rivers and surrounding organisms, and ensure biodiversity. Therefore, in the design of river landscape, it is necessary to reduce the damage to the natural landscape of the river, maintain a good water cycle, and reduce pollution problems [7].

4. Waters design

4.1. Barge design

4.1.1. Natural prototype revetment. Natural prototype bank protection is to restore the characteristics of the river's original ecology, and its flood resistance is relatively poor. The practice is usually to spread fine sand and pebbles around the river, and plant some water-resistant plants, such as cattails and reeds.

4.1.2. Artificial natural shore protection. Artificial natural bank revetment is based on natural prototype bank revetment, clever use of natural stone, wood and other materials for bottom protection to enhance the bank's flood resistance. For example, wooden piles, gabions, or concrete construction embankments are used at the bottom of the slope, and then trees and shrubs are planted on the slope to use the solidification of the root system to enhance the stability of the bank protection. The artificial natural bank revetment can be made into a gentle slope type, step type, backward type or a combination of various forms based on the actual situation to ensure flood resistance on a natural basis.

4.1.3. Engineering revetment. The engineering bank revetment mainly considers its functionality. The vertical bank revetment creates a high drop from the water surface. There are many disadvantages in both hydrophilicity and landscape. But if there is not enough space or the water level changes greatly, this kind of engineering revetment is worth considering, but if there is enough space, the revetment can be arranged in steps. (Figure 1)
4.2. Design of hydrophilic facilities
There are various types of hydrophilic facilities, which are activity places that extend from the land to the water surface, including hydrophilic platforms, hydrophilic steps, hydrophilic lawns, hydrophilic trestle bridges, hydrophilic banks and mooring docks. The hydrophilic platform, according to its function, is a place for fishing, paddling, entertainment and other activities. Most of the platforms are circular, fan-shaped, or square. The hydrophilic step is a step-like step, which has a gentle slope as a whole. It is a step designed according to the change of the water level. It provides people with the opportunity to be hydrophilic. The half of the step width is set to 0.3 to 1.2m. It can also be used for fishing and viewing. Place. The hydrophilic lawn is a soft landscape, and it is a place for people to walk, fish, and play in water. The hydrophilic trestle is a guided facility that guides people to the water surface to experience different landscape feelings. The main function of the hydrophilic bank is protection. The waterfront line is generally staggered with natural stones and scattered naturally with the shore, harmoniously and naturally with the surrounding landscape. The mooring dock has the function of transportation. For the abandoned dock, it can be transformed into a cruise ship dock or a hydrophilic platform to provide a place for people to entertain and entertain. (Figure 2)

4.3. Green Design
The plants in the outer space of the river are important factors that constitute the overall environment. Not only the characteristics of the plants themselves, but also the conditions of the soil and the impact of the plants on the environment must be considered. The green space shaped by plants around the river channel not only has the characteristics of rich river species diversity, but also creates a landscape experience that is more hydrophilic and comfortable compared to other green spaces. Most plants in river waters have the function of purifying water and decomposing heavy metals. When the revetment is a slope bank, the plants need to be planted with water and moisture resistance and strong rooting strength. Trees and shrubs can be used. The strong root system can inhibit the stormwater runoff from washing the bank. When the revetment is a bank, vertical greening is often used, which
has visual continuity, and needs to control the planting density, while also considering the landscape. The planting of plants needs to consider the overall sense of space and layering. A single tree species cannot be selected. It is necessary to consider the richness of the landscape, so that the scenery can be changed step by step, and there are scenery in all seasons. Also pay attention to the color changes to highlight the natural beauty of the water body.

4.4. Hard Landscape Design

Hard landscapes include waterfront squares, waterfront buildings, hard paving, landscape sketches, and environmental facilities. The waterfront square is the main landscape node to the waterfront. It has functions of entertainment and viewing, and its area depends on the actual situation of the city. Public facilities such as seats [8]. Waterfront buildings have different functions according to their different uses. They can be management houses, commercial houses, or places for visitors to relax and entertain. However, the appearance of a building regardless of its function must Consistent overall waterfront environment [9]. Hard paving is mainly paving in various settings such as squares, hydrophilic platforms, etc. According to different materials and patterns, different styles can be created, and paving with different materials according to different functional requirements. For example, it is not appropriate to use polished fabrics on the waterfront plaza in large areas, which will cause glare. The solution to this phenomenon is to change to polished granite [10]. Landscape sketches are a carrier of humanistic features, which can convey the emotional communication between people and the environment, enrich the sense of hierarchy in the landscape, and better reflect the theme of the landscape. Environmental facilities are supplemented on the basis of other facilities, improving the functionality of other facilities, providing visitors with a better sense of experience, and enriching the overall landscape.

5. Research and analysis of representative projects at home and abroad

5.1. Kaban Lake Water District, Kazan City

The overall plan of Kazan Kaban Lake is based on water, connecting the Volga River and Kazan Ka River, using the "elastic zone" as the main design concept, excavating historical sites and cultural landmarks, and moving Kaban Lake upstream, midstream and downstream Connected as a whole to create a continuous landscape network system. Incorporating this natural ecological water gallery into the urban culture, ecology, life, society and other aspects, it will continue the local people's memories of their homes and dreams, and at the same time, it will continue to connect people with nature.

In the planning and design of the Kaban Lake channel, not only attention is given to the reflection of the landscape, but also to the solution of rain and flood problems. According to the water level in different flood and dry periods, the rain and flood facilities play a role of sponge. Absorption and release can control the whole and part of the water flow, thereby regulating the flood control problems and the aquatic environment in Kazan.

The waterfront area around the river is an open, inclusive public space. Through different landscape methods, it is created into different forms of landscape nodes to attract tourists to visit.

This ecological "elastic zone" of Lake Kaban will not only transform the gray infrastructure into green infrastructure, restore the city's natural vitality, but also lead the city's future development and will guide the city to a legend. (Figure 3)
5.2. Sanlihe Ecological Corridor in Qian'an City

The Sanli River is the mother river of Qian'an, which has bred the regional history and culture of Qian'an City, and has carried the memory of generations of Qian'an people from generation to generation. In history, the Sanli River was replenished with groundwater from the Luan River. The water volume was abundant and the water quality was clear. However, with the development of the city and the population growth, the Sanli River was severely damaged. A large amount of domestic sewage and industrial wastewater were discharged into Sanli. The river turned the mother river of the past into a sewage ditch.

How to restore the former scene of the Sanli River through the way of river channel planning and design is the focus of the design. In the design, the flexibility of the river channel was restored. As a friend with the flood, the channelized river channel was demolished, the drainage system was intercepted, and the rainwater and sewage drainage drainage facilities were adopted to transform the river channel into a multi-channel waterway, winding and twisting, with varying depths of nature River channels, according to functional and landscape requirements, have added shallow water and wetland landscapes to the river banks, and set different types of river banks, including micro-environments such as sudden areas, water splash areas, and riverside areas, using natural biological communities and plant communities The self-cleaning function restores and improves the contaminated soil and water quality. Through the restoration of natural ecology, the ecological revetment landscape structure of biodiversity in the past is achieved.

Ecological bank protection includes waterfront, sparse grassland and so on. In the waterfront zone, plants are planted on the waterfront on both sides of the river in the form of dots, bands, and blocks. In order to beautify the river, enrich the river landscape, and stabilize the embankment, it can plant some native plants, such as willows Tamarix, reed, cattail, lotus, water lily and other plants. In sparse grassland areas, trees with large crowns, such as ginkgo, spruce, maple, and Chinese locust, can be selected. The grassland should be selected from native plants that grow better, such as Pennisetum and Chrysanthemum. Arbor planting density should not be large.

For the design of the Sanli River landscape, excavating the long history of Qian'an Papermaking, Qian'an has the reputation of “Northern Paper Township”. With the theme of origami art, it designed an “origami art” ecological corridor to provide a comprehensive ecosystem service for the city, A place with educational and artistic experience.

The reconstruction and design of the Sanli River has restored the former sight of Sanli River and reminded the citizens of Qian'an that the river where fish and fish can be fished in front of the house when they were young. Sanli River carries the changes of Qian'an history and is full of vitality Qian'an is moving towards a booming state. (Figure 4)
6. Conclusion and prospects
The development of urban modernization has promoted the development of China's economy, but in the process of development, the protection of the ecological environment has been ignored. Large-scale, continuous human activity disruption has caused varying degrees of damage to the environment, resulting in incompatible development of resources, economy, and the environment. The deterioration of the environment has affected the normal human needs.

This article analyzes the design and planning of the river from the perspective of ecological landscape restoration, controls artificial interference, optimizes the transformation of the ecosystem, and creates a natural artistic conception, so that the internal factors are interrelated, restricted, and promoted, and the internal environment is coordinated development. The purpose of this article is not only to provide an excellent leisure living environment for the city or even humans, but also to prevent environmental safety before it happens. In the future reconstruction or planning of river channels, the ecological and humanistic concepts will be integrated into the road design to Late management reduces pressure on economy and governance.

We must adhere to the concept of ecology and use ecological theories and methods to promote the development of human society. Only by integrating all aspects of detail can we create a better living environment and meet the elements of human sustainable development.

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