Study on landscape design of urban riverside green space based on environmental behavior——Take the small garden of Nanchuan East Road in Xining City as an example

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Abstract. Urban riverside green space is not only an important part of urban ecosystem, but also an important carrier of urban civilization, but also a green space for people to travel and relax every day. This paper summarizes the connotation of urban riverside green space and environmental behavior, discusses the interaction between landscape design and visitor psychology and behavior from the perspective of environmental behavior, and designs the landscape design of Nanchuan East Road Park in Xining City with functional zoning as the starting point.

1. Introduction
From ancient times to the present, human civilization has been born by rivers. Rivers, which once played an important role in the human world in drinking, irrigation, and shipping, no longer play a role in drinking, shipping and production[1]. Nowadays, as an important component of urban landscape, urban river channels and riverfronts are not only important carriers of urban civilization, but also bring ecological, cultural, social and economic benefits. In recent years, China's rapid economic take-off, urbanization process accelerated development, people's yearning for the ecological natural environment is increasing day by day, the demand for green public space has also greatly increased, therefore, both close to the natural water system, but also to build a slow-moving urban green space of urban riverside green space planning and design is particularly important. Combined with the theory of environmental behavior, this paper explores the interaction between landscape design and tourists' psychology and behavior, and makes a humanized design and Research on the small garden of Nanchuan East Road in Xining city to meet the needs of different people, so as to provide some reference for the future urban waterfront green space landscape design.

2. The theoretical basis of the study
2.1 Urban riverside green space
Rivers are the cradle of the birth and development of human civilization. Since the beginning of the last century, many countries, led by the United States, have experienced more than 100 years of development and have now achieved great success in the construction of urban riverside green spaces[2]. China started late in the construction of urban riverside green space, until the 1990s, the construction of urban riverside ecological landscape gradually entered people's sight. Urban riverside green space
generally refers to the river in the urban area, the narrow area on both sides of the river, this area has a long shore line, wide field of view, natural water features, strong circulation and so on[3]. Unlike the Riverside area on the outskirts of the city, the ecological construction of urban riverside green space is the most important part of urban greening construction due to the dense population, land use and low greening rate. Xining City, Qinghai Province, as a typical highland city, has less water resources on the surface than other low-altitude cities inland. The Weishui River and its tributary rivers, the Nanchuan River and the Beichuan River, meet from the west, south and north in the urban area and flow eastward through the city. Therefore, it is particularly important to fully excavate the surface water resources flowing through the city and make use of existing urban rivers for landscape construction and upgrading.

2.2 Environmental Behavior

Environment-Behavioral Studies is a discipline that studies the laws of human psychological and behavioral activities in different environments, with the fundamental aim of exploring how to maximize the comfort of the surrounding environment so that people can live in a sustainable harmony with the environment. The term environmental psychology was born at a meeting of the American Hospital Association in 1964, and the world's study of environmental behavior began in the 1960s[4].

Environmental behavior theory holds that human behavior is a response to some kind of stimulation given by the external environment, the environment and behavior are interactive, the environment will affect human behavior, human behavior will also change the environment[5]. The mechanism of the mutual action between man and the environment can be reduced to the mode of "human perception of the environment - human cognition of the environment - the impact of the environment on people - changes in human behavior or changes in human environment", in which the human perception is the basis of everything, when the external environment gives people positive stimulation, people's psychology will tend to be happy, open-hearted and other emotions, such as staying, walking, playing behavior; Disgust and other emotions, the emergence of far away, or even environmentally damaging behavior. The components of landscape include landscape, plants, architecture, roads and skits, among which plants are the main landscape in urban riverside green space, and the mechanism of environment and behavior is also widely reflected in plant landscape design.

Numerous studies have shown that people naturally tend to occupy a range of spaces, i.e. the personal domain, especially in outdoor environments, where a space that feels safe, at home, and undisturbed is more popular[6]. For example, in a tree square, if one person is already sitting under a tree, others tend to choose other empty tree chairs. If people's demands on the personal field are more motivated by a desire for safety, then people's preference for private spaces stems more from a cautious approach to human distance. Privacy is a more stringent requirement than the domain. Private space generally has the elements of closure, enclosure, end, quiet, etc. in this condition, the shade of the corner, the small space in the concave, the seats surrounded by three sides of the hedge are more private than the tree square space. Edward Twitchell Hall Jr., an American anthropologist, divides interpersonal space distance into four types of intimacy: intimate distance, personal distance, social distance, and public distance[7]. In a private space, people who are closer to each other get closer, and those who are closer are excluded, which in turn strengthens the privacy of the space, thus making the individual in the space feel more comfortable and the feelings between the groups positively affected.

Psychologist Derk de Jonge has developed the boundary effect theory that the boundary of space is especial and that people prefer to stay on the edge of space by finding that areas such as the center of uninhabited wilderness and open space are more deserted, while the edges of forests, trees, beaches, open spaces, etc. are more popular. The edges of space make people feel safer behind the environment, not fully exposed to others, and make it easier for people to observe other areas of space if they want to leave the space.
3. An overview of the small garden on Nanchuan East Road in Xining City

3.1 Geographical location
The design area is located west of Nanchuan East Road in Xining City, Qinghai Province, on the east bank of the Nanchuan River, south to the flood bridge and north to Kunlun Bridge, and covers an area of about 11.56 hectares (173.38 mu). The design area consists of two riverfront zones, the two areas are separated by Liuyi Road, and are interrelated in function and form, and jointly assume the role of providing daily recreation space for the residents around the Nanchuan River.

3.2 Climatic conditions
City central district is located in Xining city, 2261 meters above sea level, the annual rainfall is small and concentrated, the annual average precipitation of 380 mm, evaporation of 1363.6 mm. Ultraviolet light is strong, the daily temperature difference is large, belongs to the northern temper zone plateau semi-arid continental monsoon climate. The annual average temperature is 6 degrees Celsius, winter is warm and summer is cool, the average temperature in January is about minus 10 degrees Celsius, and the average temperature in July is about 10 degrees Celsius. Frost-free period is short, 65-140 days.

3.3 Cultural connotations
Xining City is located at the source of the Three Rivers and the Valley of the River. Hehuang culture originated around 2,000 D.C., and by the Ming and Qing Periods, with the continuous expansion of China's territory, all ethnic groups could coexist harmoniously in this vast land, and cultural exchanges between various nationalities and religions became more frequent. This design mainly through Wu Ge Yuan Jian, the leader of Qiang tribe in the early Warring States Period, Li Shitai, a famous doctor of the Qing Dynasty who cares about the sufferings of the people regardless of the rich and the poor, and Tangfan ancient road Princess Wencheng took when she married Tibetan regime in ancient China, to reflect the profound connotation of the Hehuang culture[8]. For example, in the "Hehuang Road" attractions in the form of embossed landscape walls to show the geographical context of the ancient Road and the historical process of the river culture, in the "Copper Carving cultural journey" attractions with brass figure sculpture reflects Qinghai's long history of those brilliant characters and spiritual wealth.

4. Xining City, Nanchuan East Road small garden planning and design

4.1 Overall design
The design is generally natural layout, the two plots are separated from each other, and the form echoes each other, connected as one. The landscape structure presents the form of "two axes and four zones", which runs through the whole site by a winding main road, and a number of landscape nodes are connected in series to form a complete landscape sequence. As the tour route unfolds, visitors will be in it, feeling the changes in the quiet space and the activity space. With plant landscape as the main body, combined with water body design, paving site layout, etc., to create a distinctive features, ecological and landscape effects are good riverside green space. (Figure 1)
4.2 Feature partition
According to different functions and tour content, the design site is divided into tourist leisure area, elderly activity area, children's activity area and youth activity area (Figure 2), in four areas a total of 17 landscape nodes (Figure 3), their form, function, plant configuration, service population, landscape effects and so on are different.

![Functional Division Diagram](image)

Fig.2 Functional Division Diagram

![Scenic Spots Diagram](image)

Fig.3 Scenic Spots Diagram

The planned area of the tourist leisure area is 6.19 hectares, accounting for 53.55% of the total planning area of the park, with a total of 10 attractions, with plant landscape as the main body, forming a quiet recreation space for people to enjoy. Plant configuration, the upper layer with Picea crassifolia, Sabina przewalskii, Malus micromalus, Mountain Peach, Prunus armeniaca, Ulmus pumila, Purple-leaf plum, weeping willow, lilac and other trees, the middle layer with Japan Euonymus, Common Boxwood, Red-Barked Dogwood, Rosa xanthina Lindl and other shrubs, the lower layer with scarlet sage, peony, Chinese Pink, Cosmos, Creeping red fescue, dandelion and other ground cover plants, lawns are mostly Creeping red fescue, Poa annua, dandelion and Green Bristlegrass Herb, forming a combination of green
landscape, to meet the needs of summer tour shade. At the same time, it effectively solves the problem of strong ultraviolet light in highland cities and poor shade of new green space. [9]

The planning area of the elderly activity area of 1.92 hectares, accounting for 16.61% of the total planning area of the park, to "Hehuang Road", "The shade of Sophora japonica" and "tea-drinking chess room" three attractions, combined with garden cultural skits, tree square and other landscape elements layout, forming a space for the elderly to communicate and leisure, organize recreational activities. For the surrounding residents to enjoy the scenery at the same time, square dance, instrumental music, tai chi and other cultural and leisure activities. Plant configuration, the upper layer with Neosinocalamus affinis, Sophora japonica, Sabina przewalskii, lilac and other trees, the middle layer with Ligustrum obtusifolium, Flowering plum and other shrubs, the lower layer with Sedum spectabile Boreau, Coreopsis basalis, pot marigold and other herb flowers. The spatial level of the old people's activity area is more open than that of the tourist leisure area, and the road inside the landscape node does not have steps or steep slopes, which is convenient for the elderly to move.

The planning area of children's activity area is 1.29 hectares, accounting for 11.16% of the total planning area of the park. There are two landscape nodes in the park. The " Copper Carving cultural journey" scenic spot is for visitors to enjoy the Hehuang culture with a long history while viewing it. The "children's dream Paradise" scenic spot is a playground and facilities for school-age children to play, which is a place for children to play. In the " Copper Carving cultural journey" scenic spot, the plants are mainly Populus cathayana, Populus bolleana Lauche, Picea crassifolia, Malus micromalus and lilac, and the paving is mainly made of smooth and non slip granite slate, creating a serious and quiet artistic conception, reflecting the heavy cultural connotation; in the "children's dream Paradise" scenic spot, the plants are mainly flowering plants, such as Mountain Peach, Prunus armeniaca, Spiraea mongolica, Rosa xanthina Lindl and Flowering plum and so on, the pavement is mainly made of rubber materials.

The planned area of the youth activity area is 2.16 hectares, accounting for 18.68 per cent of the total planning area of the park, and the area is a cultural and recreational space with a total of 2 attractions. The entrance square covers an area of about 0.26 hectares and is mainly paved with granite slate materials, mainly to meet the needs of visitors for collective activities and gatherings, with garden skits, showing regional cultural characteristics[10]. "Stepping flower room" and "Bibo Lake" attractions to plant landscape and water landscape, respectively, for visitors to enjoy.

5. Outlook
The relationship between man and nature is inextricable. With the rapid development of society and the widening of people's horizons, the demand for natural ecological landscape will be more and more. In urban space, riverside green space not only plays a role in improving the river water environment and improving the ecological nature of river landscape, but also is one of the most important areas in the landscape component, the importance of rational planning and design of riverside green space is self-evident. Highland city's above-ground water resources are relatively scarce, in the urban green space system, any green space that can carry out waterfront recreation landscape planning green space is very important, in the future, the plateau city riverside green space related research and practice will be more and more, I hope this paper can contribute to the research in this field of modest strength.

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