

Research on the Application of the Concept of Sponge Cities in Urban Landscape Planning

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Abstract: Landscape architecture has developed rapidly since a long time ago. Green space in cities has been slowly designed as parks and greenways, with greenery decoration becoming systematic and integrated. Emerging late in China, the concept of landscape and public space design was not put forward until the first five-year plan after the founding of the People's Republic of China. After entering the 21st century, with the development of landscape architecture, China gradually attached importance to and developed landscape and public space design. As people deepen their understanding of the world and the earth, the awareness of environmental protection has been enhanced. The urban construction and development have brought about a negative impact on the environment. On the other hand, because people selectively ignored sustainable development, it has in turn caused a passive influence and restricted the development direction of cities. Especially in the rainy season in summer, cities often fail to make effective use of rainwater resources and are damaged.

Keywords: Concept of Sponge Cities; Urban Landscape Planning; Design

1. Introduction

With the continuous development and progress of China's economy, people put forward higher requirements for the living environment. High-rise buildings have recently sprung up, providing people with more choices about their living environment. Regarding to the living environment, landscape design is an important part of the living space. The construction of sponge cities can make full use of rainwater resources in summer. Storing a large amount of water resources makes it possible for them to be utilized for irrigation and for other urban water consumption. The concept of sponge cities and the main purpose of science and technology applied in practice are to enable rainwater to be reused and to promote the healthy development of cities.

2. The design concepts of sponge cities

2.1 The concept of conforming to topography, taking advantage of the situation, and governing by non-interference

Conforming to topography refers to coordinating development planning according to the terrain and geographical conditions, and making use of the original mountains and landforms of mountain basin. Taking advantage of the situation is to guide the river channel management according to the trend of topography. Governing by non-interference means not to interfere by human consciousness, not to change the original ecological form of river channels, to keep the "three red lines" of

watershed governance, and to resist floods and disasters in rainy season in a natural state, without causing damage to personal and property safety.

2.2 The concept of low impact development

Low impact development and maintaining the original ecology of the site refers to practices that adopt ecological measures to effectively weaken the negative environmental factors such as river channelization and water pollution.

2.3 The concept of green, ecological and sustainable development

The concept of green, ecological and sustainable development is to protect urban natural environment through the rational use of urban natural resources, to prevent the environment from being affected and destroyed by other factors, to maintain the balance of natural ecological environment, to protect the diversity of biological species, to balance the relationship between biology and ecological environment, and to guarantee the green, ecological, healthy and sustainable development of human society.

3. Application of the concept of sponge cities in urban landscape planning

3.1 Design of building roofs

The role of buildings is emphasized in garden-style landscape design under the concept of sponge cities. As the focus of sponge cities is the utilization efficiency of rainwater, the design of building roofs has become the pivot of garden-style landscape design. The urban population in China is constantly increasing, leading to the changes of people's living environment and the shrinking trend of area. To conform with the concept of sustainable development and guide cities to develop in a healthy way, various factors in practice should be fully considered. The present situation of roofs of urban buildings in China indicates the bad greening of roofs. The reason is that people don't know enough about space utilization; on the other hand, there is no sufficient condition. Specific solutions should be taken according to different environments^[1]. It is now necessary for China to advocate the concept of roof greening, help people form a positive

understanding, and gradually grasp the correct design methods of building roofs, so as to promote the utilization value of building roofs and effectively improve the urban environment. Emphasizing the concept of green in the design of building roofs is to plan green planting areas on the top floors of various buildings and structures, usually including terraces. Green roofs can reduce the runoff of roof rainwater, maintain part of rainwater on the roofs for the growth of green plants and flowers, and improve the quality of flood control and drainage in cities. In order to effectively utilize green roofs, rainwater should be controlled from two aspects. One is to set vegetation layer on the roof to intercept and absorb rainwater, and then the greening of environment can be achieved by the plants' natural functions of purifying rainwater and degrading pollutants. The second one is to utilize the substrate layer of plants to purify rainwater and degrade pollutants. That is because the permeability of the soil in the substrate layer enables rainwater to be purified during the infiltration process and become water resources that can be effectively utilized.

3.2 Design of urban greening

The design of urban greening should first highlight the characteristics of greening, and at the same time, apply the ecological development to maximize the best ecological benefits. Secondly, the planting of trees in the park should also be planned according to the size of the park, and take the functions and scale of the park into account^[2]. For example, to better enjoy the beauty of plants, they can be planted within a limited line of sight by utilizing trees as a divided space. Some special areas in the park, such as game areas, can be kept out of the noise by taking advantage of the enclosure of trees. Trees can be also planted for shading and soundproof the rest area. In addition, deciduous trees are selected to be planted near buildings, so that they can play a role in shading in summer and more sunshine can pass through them in winter. Finally, the combination of points, lines and planes should also be reflected in the spatial layout. The setting of seats should meet the needs of interpersonal communication. For instance, two benches opposite to each other can facilitate communication between people, otherwise, there will be opposite effect. Moreover, planting trees around benches can prevent the paint of benches from falling off due to the sun exposure. Such

designs of the park are humanized to a certain extent, and the urban design can to a great extent meet people's needs in daily life. The construction of cities should be based on the people-oriented concept. Facilities such as pavilions, seats, and entertainment facilities can be added, as well as trash cans and signs, parking lots and public toilets that are convenient for people's lives. They need to be maintained by the citizens.

3.3 Optimization design of plants' colors

Nature is rich in colors. The design of plant landscape should conform to the principle of color complementarity. Plants can interact with people, and green and yellow plants are beneficial to people's eye health and relieving visual fatigue. The ecology and interest of urban landscape space can be improved by creating a unique natural landscape. Combining with the naturalness principle of color design of urban landscape, sandpits and small lawn hills within the safe size can be designed for people with consideration of people's interest in sand and soil. The quantity of plants can be increased by use of the curved outline of space, the main principle of which is that the green plants of unstructured visual organization can create buffer zones in the activity space. Three-dimensional planting form of foreground flowers, medium shrubs and background trees increases the planting of shrubs and lawns in the park, enriching the plant landscape of people's visual height. "To see a world in a grain of sand and a heaven in a wild flower." The planting of flowers in cities adds to the fascination of space. It helps people intuitively follow the color changes of flowers and other plants from season to season, and create a simple and natural educational space for people. People are able to observe and know plants and participate in planting activities, and their interest in nature and thirst for knowledge can be aroused while getting close to nature.

3.4 Repairing and protecting natural sponge

Sponge plays an important role in sponge cities. Most rainwater participates in water-gas circulation through penetration and conservation of land, and through vegetation storage and slow evaporation. Such process not only solves the problem of water resources, but also plays a great role in protecting the ecological environment. However, there is no enough pro-

tection for natural sponge of cities during the continuous development, and its performance is destroyed to a certain extent, resulting in the drainage of rainwater only through the urban drainage system. Many rainwater-related problems are caused, such as frequent waterlogging, runoff pollution, massive loss of rainwater resources, ground subsidence and damage to ecological environment. Therefore, it is necessary to protect the original terrain to protect the natural sponge such as lakes and wetlands. In the construction of cities, an ecological sponge system should be established for promoting the self-repair of sponge, speeding up the construction of urban water systems, and dealing with the urban flood problems as well^[3]. In addition, the shortcomings of cities are made up. A wonderful urban environment brings people beautiful moods and also arouses people's sense of responsibility to protect environment and take good care of public property. For example, repaving a road that hasn't been repaired for a long time is convenient for people's travel and life. Then everyone will protect the road for the convenience of life in the future. In addition, it is necessary to rebuild public facilities, repair old buildings and landscapes, encourage people to improve their living environment, and combine cities with society. Moreover, some personal habits should be integrated into the new life. All of these countermeasures are helpful to maintain the good image of old cities and improve the safety, as well as to keep the landscape environment and public space of the par. Only in this way can it provide better convenience for people.

4. Conclusion

The concept of sponge cities is closely related to the concept of sustainable development and environmental protection, which reflects people's concern and love for the living environment in modern society. Cities are the main areas of human production and life, and the earth is where human beings survive. It is vital to improve the structure of urban development and construct ecological, scientific and economical cities. To sum up, the scientific concept of development should be reflected in every detail to guarantee cities' sustainable development.

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