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Original Paper

Analysis of Sponge City

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Abstract

The purpose of Sponge City construction is to reduce urban water logging, reduce losses, increase the storage capacity of rainwater and flood resources, alleviate the shortage of water resources, and promote the healthy development of cities. This paper mainly studies the definition, construction idea, purpose, concrete measures and development trend of sponge city, and expounds the related problems of Sponge City in a systematic and comprehensive way.

Keywords

Sponge City, urban construction, ecosystem

1. Rational Cognition of Sponge City

1.1 Related Concepts

Sponge City refers to "A city with good elasticity like a sponge in adapting to environmental changes and responding to natural disasters". Follow: "seepage, hysteresis, storage, net, use, platoon" this six-word policy. When it rains, it is possible to suck, store, seepage, clean water, and release and utilize the stored water when needed. In recent years, Sponge City construction has been popularized and implemented throughout the country.

1.2 The Production of Sponge City

With the rapid development and promotion of Chinese urbanization process, some cities are prone to flood disasters, water scarcity and a series of natural disasters due to geographical factors. In this context, China gave birth to the concept of "Sponge City". Sponge City is a new concept developed in the process of urban construction today, compared with the traditional urban waterproofing project, it establishes low-impact utilization of rainwater system mainly through buildings, squares, roads and other infrastructure, its main purpose is to reduce the impact on the local land, water and air in urban construction process. In the construction process of sponge city, we should emphasize the integrity of site design and the protection of local natural ecosystem. There are three major concepts in the

construction process of Sponge City: First, make full use of rainfall resources, they can be recycled within the city. Second, combine urban site construction with rainwater management projects. Third, actively utilize natural soil and vegetation to improve rainwater utilization efficiency.

1.3 The Purpose of Sponge City Construction

Sponge City construction has the following six main purposes: (1) Comprehensive utilization of rainwater resources (2) Source dispersion control, slow down or reduce surface runoff, delay peak (3) Through green infrastructure, reduce the pressure on grey infrastructure (4) Reduce urban surface source pollution (5) Slow down or reduce urban water logging (6) Repair and rebuild urban water ecosystems. Sponge City construction is to repair and rebuild the structure and function of water ecosystem, mainly to cope with small and medium-sized rainfall, can partially alleviate urban water logging, but not completely solve. It is an unscientific fantasy that some people want to replace grey infrastructure and urban drainage infrastructure with Sponge City technology. Sponge City construction should adjust measures to local conditions and time, cities with different regions, different seasons, different venues, different hydrological conditions should have different measures and approaches in the process of Sponge City construction.

2. Concrete Measures to Build Sponge City

2.1 Measures of Relieving Rainstorm and Flood

In the construction of Sponge city, it is mainly to reduce the flood peak of drainage facilities and increase the utilization rate of rainwater by reducing the intensity of rainstorm, delaying the confluence time, increasing the cut-off space of rainstorm water and constructing the hysteresis project.

(1) Add rainwater harvesting devices in new projects or expansion projects to collect rainwater for greening and community fire water.

(2) Achieve the purpose of “hysteresis” in the community or roadside through the construction of concave green space, green roof.

(3) The length of reflux pipe and open channel can be reconstructed or built to delay the confluence time of the main drainage pipe network.

(4) Increase the diameter of drainage pipes and built underground water storage works in order to reduce the amount of confluence.

2.2 Measures of Storing Water

Built rain pollution shunt pipe network and make use of landscape pond to solve urban rainstorm and waterlogging, so that rainstorm water through the sinking of green space and pipe network flow into the landscape pond. Make full use of the storage capacity of the existing landscape pond, so as to reduce the confluence of the supervisor network and reduce the pressure of the drainage supervisor network. Through ditches, culverts connected to similar ponds, so that the landscape water is in the flow of circulation state. Increase the vitality of landscape water and enhance the self-purification capacity of pit pond, take measures to effectively control the water level of each pit pond, increase the

function of storage through the weather warning and forecast. Establish water ecological restoration facilities to improve the self-purification capacity of landscape water. Through ditches, culverts connected to similar ponds, making use of pumping stations and other facilities to make pond water flow up. In the landscape pond, the floating island water purification plant is used to purify the water body. In the non-flood season, the wetland water and the urban landscape pond water exchange and return, so that the urban water body is in a circular state, and we could alleviate the urban drainage pipe network pressure and water body self-purification effect.

2.3 Drainage Measures

The ecological technology of water restoration and urban surface source pollution control are further integrated to create an ecological urban drainage system. The technical systems such as promotion of infiltration, soil retention, dry ponds, surface drainage and grass planting trenches are combined with large area adjustment settings such as large canals, lakes and wetlands to achieve the unified coordination of urban drainage, decontamination, ecology and landscape. Ecological drainage needs to achieve the effect: reducing 70%-95% of urban rainstorm runoff, delaying rainstorm runoff peak 5-20 min, effective removal of pollutants in rainwater runoff, saving rainwater reuse costs, beautifying the environment, creating a comfortable living space; reducing the pressure on the regional environment by cities; eliminating or reducing rainwater pipelines to reduce the cost of municipal construction.

3. Conclusions and Prospects

For the urban development process, Sponge City is not only a transformation of the urban construction model, but also a long-term planning focusing on the needs of the higher level of the environment. Starting with the geographical environment of the city, this paper scientifically analyzes the relationship between the basin and the city, carries out comprehensive planning for the hydrological process, protects the quality of surface water and groundwater and ensures the safety of water supply, and finally promotes the construction of urban flood control system. We will promote the study of urban hydrology and ecological hydrology, improve the urban hydrological basic data under different environmental conditions, and consider the various scenarios of urban normal rainfall and extreme rainstorm in an integrated manner to enhance the reliability of the technical measures of Sponge City. In addition, foreign countries have begun to pay attention to the social benefits of Sponge City construction process, and widely promote social investigation. With the public's views and practical actions as a reference, the goal is to improve the public participation rate, so that rainwater utilization is more socialized, and the public correctly understand their obligations. But such studies have seen a conflict between urban socio-economic interests and the science of sustainable development. As a result of the increasing diversity of regulatory, technical and demand structures, the prospects for water management systems established in cities over the years is uncertain, it is increasingly difficult for public utility managers and scientists in the field of water resources research to reach consensus on sharing strategies. In addition, most of the existing hydrological models ignore the use of water

activities in human society. It can be seen that there are still some blind areas in the development of such models, and the research on the field of sociology in Sponge City construction will be paid much attention.

References

Fu, J. (2019). Research on the non-ecological status and optimization path of Nanjing Urban Construction. *Chinese collective economy*, *2019*(6), 33-35.

Sun, X. (2019). Present situation, countermeasures and prospect of sponge city construction in China. *Energy saving and Environmental protection*, *2019*(1), 40-41.

Zuo, H. H. (2019). Review on the research progress of Sponge city construction Abroad. *Industry and Technology Forum*, *2019*(1), 102-103.