Water Circulation Construction exploration of Sponge City in Weidong-new-city

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Abstract. The sponge city has been transformed from theory into a rainwater harvesting and utilization project being implemented in many cities in our country. Rainfall control and utilization are no longer on the bargain but as an important strategy for the state to guide urban construction. In order to achieve the purpose of controlling rainwater resources and the utilization of rainwater resources, combining rainwater treatment with landscape design is the most direct and effective method. At the same time, the urban water also includes the urban landscape water. If the landscape can solve the problem of rainwater control and rainwater utilization by its own advantages, it not only makes full use of the rainwater resources but also saves the urban water resources. Based on the experience of foreign countries and the reference of the case, we also need to carry out a systematic study of its specific contents. The purpose of this paper is to systematically study the concept of sponge city under the premise of low impact on the development concept, The type of urban greenland related to landscape is analyzed in depth, the role of different types of sponge facilities in stormwater management is summarized, and the concept, construction and related issues of sponge city are briefly analyzed.

1. Problems caused by urbanization

With the reform and opening up of our country, the acceleration of urbanization and the development of urbanization will make our life more convenient and prosperous. The 18th National Congress of the CPC also explicitly proposed that we should speed up the development of urbanization and meet the people's ever-increasing material needs Cultural needs [1]. The development of urbanization is just like the two sides of a coin. When we enjoy the convenient and affluent life brought by urbanization, we can not neglect the environmental problems it brings. After the Industrial Revolution, large cities emerged like spring after spring, such as London in England, New York in the United States, Tokyo in Japan, and Beijing and Shanghai in China. In cities rich in material resources, people began to pay
attention to a problem that the living environment of an urban area is getting worse and worse, the space for people's activities is becoming smaller and smaller, and the green space in the city for people's recreation and entertainment is becoming more and more variable. More and more crowded, water resources in the city began to become extremely scarce, urban water pollution is more serious. The main reason is the development of urbanization. More and more reinforced concrete replaces the original vegetation and soil. The "Great Leap Forward" mode of development has made the green space originally capable of self-regulation become unable to breathe. Some groundwater levels and soil structure also changed. Urban construction projects continue to increase, the proportion of urban ecological green area and hardened area has undergone tremendous changes, breaking the original ecosystem, resulting in the city's "heat island effect" [2]. Hardened pavement and reinforced concrete buildings led to dramatic changes in temperature, the entire natural ecology had a significant impact. Undisturbed ground increases, hinder the infiltration of rainwater, rainwater can only enter the municipal stormwater pipes, municipal pipelines can not meet the stormwater discharge when the storm hit, so in many countries the initial approach is to build a huge municipal drainage, will be Rainwater, sewage and other rapid discharge into the pipeline, not only wasting precious rainwater resources, but also caused a serious problem of water pollution, in addition to increasing the sewage treatment load. Urbanization led to changes in the original ecosystem, but also changed the water circulation system of rainwater. Rainwater can not be effectively used and discharged, and infiltration of groundwater can not be timely infiltrated. This not only causes the city to carry along with polluting water resources, So led to the city's rain and flood problems.

The rapid growth of the urban population, the emergence of factories in the cities in both state-run and private-owned forms, and the fact that little or no disregard for environmental problems do exist. In particular, some private small factories (such as paper mills, etc.) are not concerned with the environment at all and ignore the immediate interests of the country. Effluent discharged everywhere, resulting in both polluted surface water and groundwater, threatening the lives and health of urban residents. The country discharges over 38 billion tons of waste water per year, most of which are discharged by cities [3]. The untreated wastewater directly flows into the rivers, lakes and seas, causing serious pollution of surface and groundwater and seriously damaging water resources. According to statistics, the water quality of the seven major river systems and inland rivers in the country is generally polluted by ammonia nitrogen, permanganate, volatile phenol and biochemical oxygen demand, and the rivers in some cities have become sewage drainage ditches [4].

In summary, China's urban water environment has been seriously polluted, but also affected the production and life of innocent people in the basin along the polluted river. According to the statistics, only about 32% of the surface water quality of 110 surface water sources in the country complies with the first and second categories of "groundwater environmental quality standards". The pollutants are seriously over-standard and the fish and shrimp are extinct. While surface water is seriously polluted, groundwater pollution in urban areas in China has reached over 80% [5]. In Xi'an, Shenyang, Beijing, Tianjin and Shanghai, the hardness and salinity of groundwater, nitrate nitrogen and nitrite nitrogen have been on the rise. The comprehensive excess rate has been increasing year by year, greatly exceeding the standard of drinking water [6]. Groundwater pollution, water resources emergency has become a serious problem in the development of cities throughout the country.

2. Problems and deficiencies of traditional stormwater management
The serious shortage of water resources and the pollution of water sources are two aquatic ecological crises in the cities of our country, but most urban construction did not come up with corresponding solutions, which led to no solution in the event of heavy rain. The existing traditional municipal drainage facilities have the following defects: First, the pace of urban drainage construction lags far behind the pace of urbanization. Urban drainage facilities that target the traditional "fast drainage mode" are able to operate in a relatively short period of time. But this model of emissions has destroyed the original aquatic ecosystem. Secondly, there are generally lower problems in the design standards of municipal drainage facilities that have been built and it is very difficult to meet the
drainage demand in our present cities. In particular, massive surface runoff brought by heavy rains has greatly exceeded the needs of municipal drainage facilities and caused waterlogging problems in urban areas. However, there are still not reasonable and effective solutions to the problems caused by stormwater runoff in our cities. Approach, but directly to the polluted stormwater discharge into municipal pipelines or rivers, the rainwater is not enough purification or filter impurities in the process of runoff, the rainwater carrying a large number of pollutants, resulting in the pollution of ecological water sources. The infiltration of rainwater in urban areas also pollutes the vegetation on the surface due to carrying a large amount of urban pollutants and impurities, polluting groundwater sources.

In the planning and design, designers lack the concept of in-situ utilization of rainwater resources. The main measures to deal with rainfall generally adopt the traditional "quick discharge" mode, which leads to the waste of urban rainwater. In the process of urban design, there is a lack of comprehensive analysis of site topography and material selection, and no coordination with other professional departments. Rainwater utilization was not adequately considered in the design process. Mostly, rainwater management was supplemented after the entire design was basically completed. In other countries, a comprehensive analysis of stormwater management was carried out at the beginning of the program design. In the process of urban landscape design in our country, there is still only the phenomenon of pursuit of aesthetic beauty in the form of plane, lacking consideration of the ecological benefits of the landscape. This kind of design can not satisfy the control of stormwater runoff, and can not meet the requirements of underground infiltration, groundwater recharge. In the subsequent use of the process will also produce a lot of waste of water resources, ignoring the important ecological benefits of urban landscape.

3. Sponge city proposed
In recent years, our government has put forward the request of building a sponge city. "Sponge city means the city can have the same flexibility as the sponge and respond well to the change of the natural environment, especially the flood and waterlogging problems. When it rains, it absorbs water, water, seepage water and clean water, Release "and make use of it.According to the six-word guideline of seepage, stagnation, storage, net use, and drainage, the retention, infiltration, decontamination, collection, recycling and drainage of rainwater are closely integrated [7]. The sponge city advocated by people is to combine the urban rainwater, river water system, lake water system and groundwater system with the ecological facilities and municipal facilities in sponge urban design so that they form an integrated and coordinated whole. The pollution caused by the runoff of rainwater is controlled and purified, the ecological restoration of the damaged water environment is carried out, and the water resources system in the city can be sponge-like, and the sponge urban design can be well utilized in the event of rainfall, especially in rainstorm The rainwater is absorbed and stored, and the rain water is released when it is needed [8].

Although the concept of sponge city design was late in our country, the concept of spontaneous application was put forward very early. Sponge city is a medium-sized ideological concept that uses low-impact development to deal with the problems of rainwater resource utilization and rainstorm disasters. Sponge city is a mode of building a sustainable city. Sponge city is the ecological management concept that uses ecological measures to solve rainwater resources so as to maintain the urban water ecosystem and natural hydrological cycle system.

4. Research status and progress at home and abroad

4.1. Overview of foreign research
As the development of industrialization makes the process of urbanization in western countries earlier than our country, and at the same time we are also aware of the problems of lack of water resources, water pollution, groundwater depletion and foundation subsidence caused by the non-ecological urbanization. Foreign elements based on the concept of ecological design and practice of water earlier than the domestic research [9]. In the late 1990s, the United States had the concept of low impact
development (LID) [10]. Similar urban development and construction ecological concepts include the Sustainable Urban Drainage System (SUDS) in the United Kingdom, the Precipitation Penetration Project in Japan, the Water Sensitive Design in Australia (WSUD) and the Rain Collection in Germany. These countries, after decades of development, have gained more practical experience in the use and management of rainwater resources [11]. In addition, the western countries attach great importance to the daily construction of the city. Although these projects are small in scale, they are usually large in number. This will provide landscape architects, landscape engineers and urban planners with more platforms to explore various low-impact landscape development models in order to continuously summarize efficient and effective design techniques and planning tools in practice. Engineering technology should be applied to more water features and water resources utilization methods to further promote the development of low-impact development mode. In general, developed countries such as North America, Canada, Europe, Germany, Sweden, Britain, Denmark, Oceania Australia, New Zealand, Asia, Japan and Singapore have combined low-impact development (LID) The concept is widely used in rain flood control and utilization projects, the transformation of the old city, the construction of the new city, and formed the corresponding technical standards and a sound management system [12-16].

4.2. Overview of domestic research
There are serious ecological problems in the construction of modern cities in our country. The blind and grand water scenes in the transitional hard paving and landscapes have seriously affected the sustainability of water resources and resulted in considerable waste of resources. It is gratifying that relevant scholars and research institutes in China have realized that the man-made landscape and the natural environment should be coordinated and harmonious, and began to seek a scientific, ecological and humane way of development and construction. Looking at China's development in sponge city construction, we will find some important turning points: including the 2012 Low-carbon City and Regional Development Science and Technology Forum, the March 2013 release of the State Council General Office on Doing Urban Drainage and Waterlogging Protection Facilities Construction " , December 12, 2013 General Secretary Xi Jinping's speech, October 22, 2014" Sponge City Construction Technology Guide "announced in April 2015 was the first batch of pilot" sponge city "construction 16 cities and April 22, 2016 announced the construction of the second batch of pilot "sponge city" 14 cities [17-20]. This shows that China's sponge city construction is still in the exploratory stage. The research on the technical design for the ecological functions of the water elements in the sponge-type residential green space is even more rare and requires more theory and practice to continuously improve Better to improve the current unsustainable water resources, water elements of human design is not enough, the lack of ecological base of the status quo.

In summary, sponge city construction process rarely take into account the characteristics of rainwater runoff and pollution around the collection of rainwater quality and storage time, which affect the sponge city is completed can meet the water quality available or The level of utilization, seepage process will block the water seepage material and other issues. In this study, we proposed a series of optimization recommendations for sponge city construction such as water storage and water seepage through studying the characteristics of rainwater quality and pollution in sponge city of Weidong New City and the relationship between rainwater quality and accumulation time in sponge city of Weidong New City.

5. Research goals and the key scientific issues to be solved

5.1. Research goals
The sponge city has been transformed from theory into a rainwater harvesting and utilization project being implemented in many cities in our country. Rainfall control and utilization are no longer on the bargain but as an important strategy for the state to guide urban construction. In order to achieve the purpose of controlling rainwater resources and the utilization of rainwater resources, combining
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Based on the experience of foreign countries and the reference of the case, we also need to carry out a systematic study of its specific content. This article summarizes the specific operational measures and provides some references for the development and promotion of the sponge city in China. The purpose of this paper is to systematically study the concept of sponge city under the premise of low impact on development concept and to analyze in depth the landscape type of urban green space associated with landscape in sponge city design and summarize the different types of sponge facilities in stormwater management Role, and ultimately proposed sponge city under the guidance of ecological landscape planning and design.

5.2. The key scientific issues to be solved
So far, there are still some shortcomings in our country in studying the concept of low-impact development, and the specific ideas and measures for low-impact development are not specific enough. However, it is still very difficult to guide sponge city construction through low-impact development. In this paper, based on the completed sponge city of Weidong New City and low-impact development technology, the paper makes a deep research and puts forward some measures and measures for the lack of sponge city.

(1) The water quality, water quality and pollution characteristics of rainwater runoff in the sponge city of Weidong town are not considered in the construction process. By studying the characteristics of runoff of runoff in Weidong New City, the paper provides guidance for sponge city construction under the guidance of low-impact development theory.

(2) The built sponge city seldom studies the relationship between the quality of rainwater collected and the storage time, which is related to the utilization of rainwater resources at the core issue of sponge city construction. Through the research and analysis, this research proposes a reasonable recycling of rain water.

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