

Low-carbon Development and Cooperative Innovation -- Construction of Low-carbon Creative Gardens

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Abstract: Facing the opportunity and challenge of contemporary ecological environment construction, the sustainable development of urban gardens is of great importance. The essence of urban gardens is to show the beauty of garden art and improve ecological benefits. As the main carbon sink carrier, urban green space should give full play to its ecosystem service function. Low-carbon creative gardens should be based on the planning and design principles of "low-carbon, ecological and sustainable", and the creative theme of landscape architecture covers low-carbon ideas and approaches of popular science guidance and publicity, energy conservation and emission reduction, resource recycling, low-carbon plant allocation and other aspects. In addition, it innovatively adopts the mode of cooperative management and operation between enterprises and land owners, making the low-carbon creative garden not only a leisure activity garden, but also a comprehensive base integrating scientific research, education and popular science exhibition. Its ecological sustainable design concept and innovative management and operation mode have important reference significance for the future urban landscape development.

1. Introduction

With the rapid economic growth and significant improvement of science and technology level, the people's cultural, living standards and aesthetic, ecological consciousness, raised higher requirements for urban gardens. With the rapid development of urban construction, the intensity and mode of urban land use are changing rapidly. This has been accompanied by increased energy consumption and a rapid increase in carbon emissions, which has led to a series of environmental problems, such as the heat island effect and the frequent occurrence of extreme weather. In this context, urban managers, researchers and even ordinary citizens have put forward a strong appeal for "urban ecological restoration". Although garden landscape can produce important ecological benefits in urban artificial environment, it is undeniable that in recent years, the appearance and aggravation of excessive landscape phenomenon have caused a huge waste of resources for garden construction. How to unite the human, nature and ecology harmoniously, realize the maximum ecological benefit with the minimum environmental impact, and present the best landscape effect has become a difficult problem to be solved urgently in the field of today's landscape architecture. Low-carbon landscape design method provides a way to solve the above problems. It emphasizes that the goal of increasing carbon sink and reducing carbon source can be achieved through the combination of innovative application of recyclable materials and low-carbon construction methods, so as to promote the full play of ecological value of landscape.

2. Ecological environment background

In the context of resource and energy crisis, ecological environment deterioration, global warming and other issues gradually affecting the sustainable development of all countries in the world, "low carbon" has become one of the most urgent themes of The Times. After the Copenhagen climate

conference, "low carbon" has quickly become the focus of Chinese society. According to statistics, China's urban carbon emissions account for 90% of the country's carbon emissions. As an important part of the urban environment and an important carbon pool of the earth's carbon cycle, urban green space plays an irreplaceable role in low-carbon cities. Only by integrating low-carbon concepts and technologies into the design, construction and management of urban landscape architecture, can the landscape architecture industry shoulder the historic responsibility of "beautiful China" in its future development.

3. Concept analysis of low-carbon gardens

The increase of carbon emissions caused by human activities is an important factor leading to climate change. The UK first proposed the concept of "low-carbon economy" and discussed relevant issues. Since then, Japanese scholars have paid more attention to the concept of "low-carbon society". On this basis, the concept of "low-carbon city" came into being and quickly became the focus of low-carbon economy and low-carbon society. Xin zhang believes that the characteristics of low-carbon cities are: economic development of low-carbon model, citizens with low-carbon ideas and behaviors, and city managers pursuing the construction goal of low-carbon society. Qin yaochen et al. believe that the development mode of low-carbon cities is to carry out scientific spatial planning and environmental governance through technological innovation, so as to balance urban carbon emission and carbon treatment while keeping the economy and society running. Foreign scholars mainly improve the theory of urban ecosystem and explore the related fields of low-carbon community, low-carbon building and low-carbon transportation in practice.

As China is in the stage of rapid development of urbanization, it is difficult to change the dependence on and consumption of energy in a period of time. The characteristics and advantages of urban green space in increasing carbon sink and reducing carbon source make low-carbon garden become the breakthrough point for the construction of low-carbon city in China. In this context, landscape architecture scholars and practitioners actively explore the principles and ideas of low-carbon landscape design and achieve certain results. Li Shuhua proposed that "symbiosis and circulation are the basic ideas of low-carbon garden green space construction" and implemented the basic principles of ecological and sustainable utilization. Especially in Tianjin to technological innovation, people-oriented, repair guide, circulating promotion as the design principle, adopt the method of waste recycling and resource circulation process, on the water park planning and design of the "low carbon footprint", "ecological" house "set the color box" "sitting room" scenery "green" wisdom "waste electricity fable" the seven "the rain garden" each has its own characteristics of low-carbon garden, in the form of innovation design, attracting visitors on their interest and attention, thus achieve the goal of spread knowledge of low carbon and ecological restoration, arouse the awareness of low carbon.

4. Characteristics of low-carbon creative garden construction

4.1 The concept of ecological sustainability

The development of landscape architecture should be the combination of technology and art, the unity of function and effect, and the harmony of human, nature and society. In the current rapid development of urban construction process, the diversity of landscape is also fully demonstrated, excessive landscaping will lead to high garden construction costs, huge waste of resources. The essence of landscape architecture is to let people enjoy the art of landscape architecture while having the minimum impact on the environment. Low-carbon landscape architecture strives to bring the maximum landscape and ecological benefits with the minimum capital. Urban park green space is the main carbon sink carrier, the concept of low-carbon garden can bring more aspects of the environmental impact of the consensus.

4.2 approaches and methods of construction

In the construction of low-carbon creative garden, the concept, method and corresponding measures of low-carbon landscape creation are comprehensively presented in a concentrated way. Through the low carbon design concept, low carbon layout technique, low carbon material application, form the landscape depending on each other, the space encircles, the winding path leads to the secluded spot, artful because borrow, the step moves the scene to be different the landscape effect.

In the process of construction, the following four principles are mainly followed. First, the venue is priority. Site priority is to tackle the current landscape artificialization and an important principle of excessive, now many projects in a large area of the lawn, artificial stack terrain, plant a large number of transplanting and so on, makes the landscape construction and maintenance requires high energy consumption, so low carbon garden construction first needs by using of the status quo of the site condition to reduce carbon emissions, specific displays in: 1) comply with existing topography, minimize the earthwork quantity, reducing machinery operation;2) avoid high-energy landscape design due to excessive pursuit of landscape effect, such as large area of glass wall, excessive plant planting, etc.;3) explore the site characteristics, protect and make full use of the site's advantageous resources, combine the current natural landscape elements, reflect the humanistic connotation, continue the site memory, and reproduce the spirit of the site;4) the goal of landscape design and ecological restoration should be unified to build low-carbon and sustainable landscape.

Second, suitable landscape. Green land plants are natural carbon sinks, which can greatly enhance the carbon sink of the site, increase carbon absorption and reduce carbon emissions. In the construction of low-carbon gardens, attention should be paid to: 1) give full play to the role of plant carbon sink, protect the original forest land, lawn, wetland, etc., in the site, the natural plant community can effectively sequester carbon, and has a high ecological value and landscape value, meet the needs of living environment, rich biodiversity;2) focus on the application of native plants and materials, which are not only the embodiment of regional characteristics, but also have strong adaptability, which can not only reduce the later management and maintenance, but also avoid the carbon emissions caused by long-distance transportation in the construction process.

Third, recycle. With the rapid development of modern society, the use of a large number of materials will inevitably bring a lot of waste, and the resulting fossil energy consumption will cause environmental pollution. In the creation of landscape architecture, the creative reuse of waste materials can effectively reduce carbon emissions. Mainly through the following ways: 1) the use of light, wind and other natural factors landscape, as well as the adoption of rainwater collection system to achieve the recovery and reuse of rainwater;2) make use of waste materials, renewable materials and new materials after waste treatment and processing for landscape reconstruction and modification;3) waste generated by the garden itself can be recycled, such as fallen leaves, which can be composted by collection devices and become soil nutrients.

Fourth, simulate nature. The natural environment is a model of landscape design, which pays attention to the protection and continuation of the original ecological environment, simulates the structure and level of natural communities, and combines trees, shrubs and grass to form a garden landscape close to nature and wild interest. The main methods are as follows: 1) enrich plant layers and increase leaf area index; 2) reasonably match native and exotic species, deciduous and evergreen species, fast-growing and slow-growing species; 3) use vertical space and roof for greening, such as retaining wall, slope protection, fence, column, etc.

5. Key points for the development of low-carbon landscape architecture

5.1 raise public awareness of environmental protection concepts

Through the design and urban garden works, guide people to change the previous incorrect way of life. In terms of design and creation, designers are required to influence the public from a small point of view through some details, so that the public can gradually establish this low-carbon

awareness.

5.2 accelerate the renewal of low-carbon concept in urban gardens

Reduce the maintenance cost of environmental landscape. Whether in design, construction or management, each of its steps is directly related to the quality of the whole landscape. For a low-carbon environmental art creative work, the energy consumption and carbon dioxide emission must be clearly reduced at the initial planning stage.

5.3 Rational planning of the structure of garden green space

Low-carbon landscape development should pay attention to the reasonable planning of landscape green space structure, first of all, appropriately increase the native plant green space area. Secondly, effectively improve the single plant community, combined with a variety of different plant species, the composition of three-dimensional garden landscape form. Finally, in order to alleviate the urban heat island effect, the location and relationship among the landscape roads, green space structure and water resources should also be fully considered during the construction of low-carbon gardens.

5.4 focus on the cultivation of low-carbon plants

Attention to the cultivation of low-carbon plants is of great significance to the construction of low-carbon landscape architecture. It should be started from the following two aspects: first, choose plants with strong drought resistance to improve the survival rate and carbon absorption efficiency of plants. Secondly, select plants with strong anti-pollution ability and give priority to the cultivation of plant varieties with high carbon absorption rate in combination with the local ecological environment.

5.5 formulate policies to encourage low-carbon development of urban gardens

The key to the development of landscape art creative industry is to promote the development of landscape art creative industry in China, formulate sound industrial development policies, and guide the industrial development through timely measures. In this regard, in terms of industrial development, we can learn from foreign measures in energy conservation and emission reduction, such as carbon emission reduction trading, carbon tax collection, tax incentives and fiscal subsidies.

6. Conclusion

In the context of global climate change and ecological degradation, low-carbon emission reduction and ecological restoration, as important concepts of urban sustainable development, play a pivotal role in the practical development of many industries. As one of the most intimate art forms in urban landscape art, landscape gardening is closely related to the work and life of citizens. In the context of the continuous improvement of low-carbon actions and ecological restoration measures in all walks of life, the diversity of low-carbon gardens and ecological restoration should be constantly enriched in terms of diversified expression methods, technical means and artistic ideas. Low-carbon creative landscape construction is to respond to the needs of The Times. Therefore, we oppose excessive luxury landscape architecture, advocate the use of low-carbon materials in urban landscape architecture and ecological restoration, and try to maximize the ecological benefits and artistic effects of landscape architecture in terms of recyclable and sustainable development.

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