Research on Low-Carbon Living Landscape Garden Environment Design under the Concept of Green Environmental Protection

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Abstract. The scientific and reasonable design of garden landscape is one of the important means to solve the problem of environmental pollution, and it is also an important means to promote scientific and reasonable garden design and planning. In-depth and systematic investigation and analysis of current garden planning and design ideas and plans, combined with the current era background, put forward ideas for garden landscape design based on environmental protection. This idea will help improve the planning and design of green and environmentally friendly ecological gardens, build a healthy life with energy saving and emission reduction, and guide the healthy development of cities. The thesis focuses on the application of low-carbon concepts in modern urban landscape ecology, and specifically points out a variety of landscape design methods.

Keywords: Green environmental protection, low-carbon life, landscape design, environmental design.

1. Introduction
With the development of society and the continuous progress of social economy, the existing living environment no longer meets people's growing material, spiritual and cultural needs. At the same time, with the continuous improvement of people's quality of life, people pay more attention to environmental protection and green life. At the same time, the increasingly serious environmental pollution problem is the focus of attention and discussion. In order to realize the implementation of the sustainable development strategy of the society and strengthen the communication between man and nature, this article mainly discusses the impact of environmental pollution on garden landscape design and seeks a solution. Carry out detailed analysis on the existing garden design ideas, and at the same time summarize and integrate the garden design work in combination with the development trend of modern society, and explain this idea from multiple perspectives [1]. It is hoped that the construction of ecological civilization can be realized through garden landscape design, while effectively improving the increasingly serious environmental pollution problem, so as to provide a theoretical basis for future design implementation.
2. Urban characteristics based on a low-carbon perspective

2.1. **Low-carbon concept**

Low-carbon cities mainly refer to the selection of reasonable environmental structural methods, socio-economic development models, and development methods based on low carbon emissions during urban development to achieve urban functions [2]. Low-carbon urban landscape ecological planning and design is the use of technological innovation, industrial transformation and new energy openness and other related methods to reduce greenhouse gas emissions, so as to realize the coordinated development of economic and social development and ecological environmental protection.

2.2. **City characteristics**

2.2.1. **High efficiency.** Cities are areas where people gather, and there are differences between residents’ living patterns and living standards, and there is fierce competition. The urban efficiency from the low-carbon perspective is generally reflected in the minimization of energy consumption in urban operation and production, and the highest application efficiency of urban materials and energy, which strengthens the development of urban planning and design. In addition, the urban efficiency from the low-carbon perspective is reflected in the efficiency of energy applications, effectively strengthening the efficiency of urban transformation systems.

2.2.2. **Harmony.** Planning for urban harmony from a low-carbon perspective. The harmony of the city is manifested in the harmonious coexistence of residents and the natural environment. Human beings love nature and are close to nature. Integrate nature into urban planning to realize the harmonious development of the city and nature. At the same time, urban planning from a low-carbon perspective needs to be reflected in the harmony between people. Natural scenery should be selected to install the living environment during urban construction, to create a warm and edifying landscape environment, and to promote friendly relations between people [3]. The harmony of urban planning from a low-carbon perspective not only reflects the characteristics of an ecological city, but is also the main expression effect of urban planning under the low-carbon concept.

2.2.3. **Circularity.** Cyclicity is an ecosystem operating system that continues vitality. The characteristics of urban recycling from the low-carbon perspective are reflected in the virtuous circle of all aspects of the city. Scientifically plan the cycle efficiency of each system in the city to ensure that the city cycle system is in a balanced state for a long time; formulate a reasonable and easing blockage of the city cycle system, timely discover and deal with the problems faced by the city cycle development; improve the ecological system according to the city conditions, and give play to the city ecological cycle the function of the system.

3. Landscape design method based on environmental protection concept

In the long historical development process of Chinese architectural culture, Chinese garden construction art has demonstrated its unique charm to people after thousands of years of accumulation. Garden art is an architectural design art that is closely connected with social production methods and lifestyles, and it also reflects the technological and literary level of the times. The development of garden design art fully reflects the background of the times and social needs, and embodies the orientation of architectural technology development and aesthetic value. Under the background of the rapid development of the current industrial society, in the process of garden landscape design, it is necessary to fully grasp and analyse the geographical advantages and ecological system of the garden construction area, and shape the landscape personality on the basis of protecting the natural and ecological environment, so that the building Reflect with nature and form a lasting natural beauty. The garden design based on the concept of environmental protection requires the project to pay close attention to the local ecological environment during the entire operation phase [4]. We should not only
be keen on creating spaces and forms that are too stylized and superficial, but should create eco-
friendly, green and healthy garden landscapes that can effectively respond to changes in the industrial
environment in order to regulate and control environmental pollution in the city. Based on the above
requirements, the technical framework of garden landscape design with environmental protection
concepts is shown in Figure 1.

![Diagram showing technical framework of landscape design based on environmental protection concepts.]

**Figure 1.** Technical framework of landscape design based on environmental protection concepts.

In landscape design, the selection of building materials is also very important. To achieve bitterness
and environmental protection. The design goal of energy saving and emission reduction is to analyse
the energy consumption and pollution degree of commonly used building materials in accordance with
the current national regulations, see Table 1:

| Building material name | Resource consumption | Energy consumption | Pollutant discharge |
|------------------------|----------------------|--------------------|--------------------|
| cement                 | 1.8                  | 5.4                | 1.1                |
| Steel                  | 1.6                  | 28.9               | 0.9                |
| Aluminium              | 4.5                  | 1789               | 1.0                |
| glass                  | 1.6                  | 17.0               | 1.2                |
| wood                   | 0.1                  | 1.2                | 0.3                |
| Clay brick             | 1.5                  | 3.2                | 1.4                |
| Concrete block         | 2.5                  | 4.0                | 0.8                |
| Building ceramics      | 2.1                  | 1.5                | 1.2                |

The data in the table shows the energy consumption of commonly used building materials. Based
on the above content, it is recommended to select materials that are healthy and environmentally
friendly and have a small amount of sewage for garden design and construction. A large amount of
waste materials will inevitably be generated during the construction of the garden landscape. In order
to reduce the pollution of the ecological environment, the waste materials must be properly used.
Therefore, a method of reusing waste materials is proposed to make them become backfill materials.
for shaping the terrain, etc., in order to ensure the low-carbon environmental protection effect of the garden. The processing flow of waste materials is shown in Figure 2:

![Flow chart for the treatment of waste materials in garden construction](Image)

**Figure 2.** Flow chart for the treatment of waste materials in garden construction.

4. **The principles of garden design in a low-carbon economy**

4.1. *The principle of hierarchy*

For a long time, garden design has always had the problems of single design and insufficient design level. In order to solve this problem, the level of garden plants can be optimized, and trees, flowers, ground plants, etc. can be scientifically matched, so that the garden design shows a good level of hierarchy. At the same time, the flowers of various colours are arranged in layers to enhance the richness of the garden landscape. For the configuration of the background tree, the selection method of the foreground tree is lower than the background tree should be followed, and the planting density should be increased as much as possible, and the colour tone should be deepened. For clump planting, it is necessary to ensure that different trees are arranged in the same grass, and rely on artistic composition to fully demonstrate the artistic and ecological beauty of the plant group.

4.2. *The principle of adapting measures to local conditions*

Landscape design under the low-carbon economy should follow the principle of adapting measures to local conditions. The designer should grasp the geography and geomorphology of the garden and the characteristics of the area where it is located, and the relevant garden site should be set up on the basis of the original site as much as possible. In order to reduce the carbon dioxide generated during the transportation of materials, local building materials should be used as much as possible to reduce the cost of garden construction. In terms of garden plant planting, the principle of adapting measures to local conditions should also be followed [5]. The main selection of native tree species is to give priority to the selection of anti-pollution and high ecological benefits. This will not only prevent the
increase in later maintenance and management costs, but also prevent plants from dying due to inadaptability to the local environment Happening.

4.3. Principles of sustainable development

Landscape design under the low-carbon economy should also incorporate the laws of natural development and follow the principles of sustainable development. Designers should pay attention to the harmonious coexistence of man and nature, and put the concept of sustainable development throughout all links of garden construction [6]. Especially for the design of landscape gardens, we should uphold the concept of ecological and environmental protection, carry out in-depth analysis of the problems in the natural environment, rely on the scientific and reasonable application of modern technology, promote the sustainable application of natural environment and landscape resources, and ensure the quality of garden construction At the same time, further promote the coordinated development of ecological resources and garden construction.

5. Urban landscape design methods under the concept of green environmental protection

5.1. Landscape greening design

5.1.1. Retain vegetation. Strengthen the protection and management of fine urban vegetation. Ensure the long-term preservation of carbon storage in the greening system of urban landscapes in plants and reduce atmospheric carbon sources. For plant configuration design, it is necessary to retain the original vegetation resources in accordance with ecological design guidelines.

5.1.2. Optimize tree species. According to the corresponding carbon sink capacity of various greening tree species, and analyse the characteristics of urban landscape, rationally select tree species with strong carbon sink capacity and good greening effect to achieve effective integration of greening and environmental protection [7]. At the same time, comprehensive consideration of regional and climatic characteristics, based on the carbon sequestration capacity of plants, conduct actual investigation, analysis and comparison of the growth of all tree species in the city, select tree species with carbon sequestration, energy saving and air purification functions, and then scientifically plant them to provide urban landscape Ecological design provides a reliable basis. The implementation of vertical greening and roof greening, the urban environment is relatively dense, and the advancement of roof planting and maintenance technology enables some trees to grow in thin soil, which provides the possibility to realize the urban ecological design of building roofs.

5.2. Landscape ecological water design method

5.2.1. Optimize the ecological system on the shore and strengthen the landscape ecological planning of the waterfront area. Design as many natural shorelines as possible, because the soil and plants in the waterfront area are diverse and many animals live here. Moreover, there are many types of vegetation in the waterfront area, and the landscape composed of trees and herbs has become a feature of urban ecological landscape. Improve the performance of the ecosystem by reasonably adjusting the water cycle and optimizing the air. In the design of urban landscape ecological water bodies, it is necessary to ensure that the inner slope of the coast is ≤ 1:3, and the slope of the constant water level area should be smaller.

5.2.2. Rainwater collection and management. General rainwater collection includes roof rainwater, green rainwater, and road rainwater. According to various runoff collection surfaces, scientific rainwater collection and pollution interception and storage schemes are selected [8]. Prevent urban rainwater from affecting the ecological landscape, strengthen the management of landscape water bodies, try to effectively drain the initial rainwater into the water body, and apply scientific methods to improve the urban rainwater collection and discharge system.
5.2.3. **Optimization method of urban landscape pattern.** Since large natural vegetation (large patches) is the environment where species live, it needs to be considered first. For example, well-designed corridors can effectively maintain the water system and meet the survival needs of species, while some small natural vegetation (small patches) and corridors should be established in the development area to achieve landscape differentiation. At the same time, it integrates low-carbon concepts, uses concentration, dispersion, and landscape differences to create a good ecological environment and alleviate urban greenhouse gas emissions.

6. **Conclusion**
The design of garden landscape can produce changes to people’s daily lifestyles, and at the same time, the construction of environmentally-friendly and economical garden landscape art can help residents improve the pressure accumulated in daily life and work, and at the same time, it can also protect the ecological environment within the city. damage. In addition, we must actively pioneer and innovate, actively adopt different design concepts when designing landscapes, and design landscapes based on the concept of environmental protection and sustainable development.

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