ISSN: 3008-1394

A Brief Discussion on Modern Landscape Design under the Influence of Ecologism

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Abstract

The deterioration of the global ecological environment makes people begin to redefine the relationship between man and nature, and the idea of ecologism gradually rises. Some landscape architects realize the importance of ecological protection in landscape design, thus opening the exploration and practice of ecological landscape design. This paper illustrates that it is because of the environmental crisis that modern landscape design came into being, and now it has entered a new period of ecological development. The expression forms of modern ecological design thought are listed. And the connotation of ecological landscape and design methods to do a comprehensive and in-depth analysis; This paper summarizes the basic principles of ecological landscape design, and introduces the practice of "ecological" methodology combined with specific cases.

Keywords

Ecologism, **Modern landscape design**.

1. Modern Landscape Design and Its Evolution

1.1 The emergence of modern landscape design

The emergence of modern landscape design can be traced back to the social and cultural changes triggered by the Industrial Revolution. Before the 19th century, gardens were mainly owned by the royal family and nobles. The Industrial Revolution promoted the improvement of productivity, and coupled with the dissemination of Enlightenment ideas, the demand for improving the living environment among urban residents has been increasing day by day. However, rapid industrialization has led to the deterioration of urban environment, ecological damage, loss of cultural belonging, and deterioration of living quality [2-3].

During the Second Industrial Revolution in 19th century America, the disorderly development of textile and heavy industrial parks exacerbated environmental pollution and resulted in poor sanitation conditions in the neighborhoods. Lewis Mumford described New York at that time in "A History of Urban Development" as "lacking sunshine, clean water sources, and air, with monotonous and cohesive neighborhoods." [5] Utilitarian led urban planning made the landscape monotonous, and the public's demand for aesthetic and ecological functions became increasingly urgent.

The UK took the lead in opening royal gardens (such as Hyde Park) to the public, marking the beginning of landscape popularization. American landscape design pioneer Olmsted promoted the development of the discipline during the naturalism movement, expanding the functions of gardens from private to public and gradually evolving into more comprehensive "landscapes". It became a model of urban oasis along with Walker's design of New York Central Park,

ISSN: 3008-1394

triggering a wave of urban park construction in the United States, such as Hope Park and Golden Gate Park, and promoting the formation of a park system.

Overall, the urban park movement is the prelude to modern landscape design, with its function shifting towards public demand, emphasizing ecological, psychological, and social values, laying the foundation for integrating landscape design into urban planning and ecosystems.

1.2 Development of Modern Landscape Design

After World War I, the European economy gradually recovered and the social structure underwent drastic changes, providing a profound soil for transformation in the field of design. Modern landscape design emerged and increasingly highlighted its mission of the times. [8] As an independent discipline, the development of modern landscape design, although less than a century old, has had a profound impact on shaping the image of modern cities. [2]

Scholars generally divide its development into three stages: the first stage is the exploration period, influenced by early modern art and the "Art Nouveau Movement", landscape aesthetics and forms gradually evolved, and the European and American "Urban Park Movement" marked the beginning of modern landscape practice; The second stage was the period of widespread application of modernism. In the 1930s, the Great Depression in the United States promoted the development of minimalist landscape forms such as the "California Garden". In the 1940s, the "Stockholm School" reflected the integration of design and social ideals; In the 1950s and 1960s after World War II, the demand for landscape planning increased dramatically, and different countries gradually formed style schools with "modernist" characteristics and emphasis on functional rationality.

The third stage is the postmodern turning period. From the 1960s to the 1980s, environmental crises and cultural reflections led to the rise of "ecologism", emphasizing ecological and historical protection. McHarg's ecological ideas represent the Western landscape design concepts of this stage, advocating the vision of "making the earth green again, restoring and healing the earth", which has become an important theoretical support for landscape ecologicalization. [9-10]

2. The influence of ecologicalism on modern landscape design

2.1. Four manifestations of modern ecological design ideas

2.1.1. Natural Design

The industrial revolution and early urbanization in the 18th century led to dense urban populations and loss of natural space, which attracted the attention of sociologists. [2] Influenced by the Chinese concept of landscape architecture, British natural landscape parks have introduced natural elements into cities, promoting a shift in human land relations from confrontation to coordination. However, the natural introduction at this stage mainly serves the aesthetic level and does not touch upon the fundamental transformation of garden functionality. As Tang Ning said, gardens are still the selection and decoration of the "most beautiful fragments in nature". [2]

The one who truly integrates natural systems into urban structure from an ecological perspective is Olmsted. [11] In 1857, he designed Central Park in Manhattan, preserving the landscape and vegetation in a natural layout, and constructing the "urban green lung". In 1881, he presided over the design of the Boston Park system, which was based on water, mudflat and wasteland, and connected several green spaces into a ribbon greenway, forming the famous "jade necklace". [2] This design breaks through the grid city pattern, reconstructs the natural system of the city, and significantly promotes the sustainable improvement of the ecological environment. [12]

ISSN: 3008-1394

Olmsted's practice deeply influenced the research direction of natural design, and subsequently developed two main paths: one is to emphasize conforming to the original natural context of the city and reconstructing the urban ecological network through open space systems, represented by the landscape system of Chicago; The second is to advocate the establishment of a natural landscape classification system as the formal basis for natural style design, with representative figure Elliwater.

2.1.2. Localized Design

Localized design emerged during the rapid construction period in the Midwest after the American Civil War. [11] Given the widespread distribution of saline alkali soil in the region, designers tend to use drought and salt tolerant native plants and develop a grassland style landscape garden form. This model emphasizes adjusting measures to local conditions and integrating local landscape and climate conditions, which is not only economical, but also conducive to ecological protection.

2.1.3. Protective Design

The stacked graph analysis method proposed by McHarg in "Design with Nature" marks the scientific process of ecological design. [11] Afterwards, protective design can be divided into two types of paths: one is ecological planning aimed at rational land use; The other type is problem oriented in seeking solutions, demonstrating higher adaptability. With the development of science, this design has gradually evolved through stages such as resource, ecosystem, and biodiversity conservation.

2.1.4. Recovery Design

Since the 1960s, environmental crises have driven ecological design towards the practical task of restoring damaged ecosystems. Restorative design refers to the reconstruction of a self-sustaining healthy ecosystem through human intervention, promoting sustainable resource utilization. [2] Its targets include lakes, ponds, abandoned industrial areas, mining areas, and soil erosion areas. In 1990, Chen Pingren collaborated with Chani to carry out the "Regeneration Land No.1" experiment, which implanted specific plants in artistic venues to absorb heavy metal pollution from the soil, with the aim of increasing public awareness and participation in ecological restoration. [13]

2.2. Analysis of Ecological Landscape Design

In the 1960s, serious environmental pollution incidents erupted in industrialized countries such as the United States, Britain, and Japan, triggering widespread global attention to the ecological consequences of urbanization and industrialization. [2] In 1971, UNESCO explicitly stated in the "Man and the Biosphere Programme" that urban construction should follow the ecological principle of coexistence between humans and nature.

The concept of "green city" has emerged, promoting ecological parks as the core form of urban abandoned land reuse. Ecological parks have both ecological and urban characteristics, and have become an important carrier for urban landscape renewal by addressing environmental issues through interdisciplinary methods. Abandoned industrial sites such as mining areas, docks, railway stations, etc., due to their unique historical and aesthetic value, are gradually transforming into new urban landscapes, achieving the integration of ecological and economic benefits.

The introduction of ecologicalism has shifted landscape design from traditional gardens to a broader environmental level, emphasizing respect for natural laws, adaptation to local conditions, and resource conservation. Respecting ecological evolution, reducing human intervention, and advocating sustainable technologies have become core concepts in modern landscape planning, deeply reflecting the reshaping of design concepts by ecologism.

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3. Principles of Ecological Landscape Design

3.1. Principle of Respecting Nature

Natural ecosystems have the ability to self regulate and continuously evolve, providing basic support for human survival. In landscape design, the original terrain and vegetation should be utilized according to local conditions, avoiding large-scale construction interventions and minimizing damage to the ecological environment. Respecting nature and emphasizing the coexistence of humans and the environment are the fundamental principles of modern ecological landscape design.

3.1.1. Principle of ecological relationship coordination

Landscape design needs to coordinate the relationships between humans and nature, organisms and the environment, and artificial structures and natural structures, ensuring that socio-economic development is built on a healthy ecological foundation. [2]

3.1.2. Natural self-organizing and regulatory abilities

Natural systems are highly complex and self-organizing, capable of achieving self purification and repair. Wetlands, as the "kidneys of the earth," have been widely used in ecological engineering for their sewage purification capabilities. Design should leverage the dynamic mechanisms of nature to achieve active activation and sustainable utilization of ecological functions.

3.1.3. Biodiversity

Since the 1980s, humans have gradually realized the complex connections between species and their environment, and it is difficult to maintain ecosystem stability by only protecting a single species. [15] Biodiversity not only supports basic human needs such as food, oxygen, and raw materials, but is also crucial for maintaining ecological balance and promoting sustainable development. Strengthening species protection, especially for rare and endangered species, has important ecological and strategic significance.

3.2. Economic principle

Ecological landscape design emphasizes resource conservation and recycling, advocating strategies such as reusing local materials and waste to enhance environmental sustainability and economic benefits. Non renewable resources are shared by all mankind and should be used with caution. During the design process, it is necessary to avoid the disorderly development of fragile natural ecosystems, especially precious resources such as urban wetlands. [16]

3.2.1. Efficiency of Energy Use

Reasonable utilization of clean energy such as solar energy, wind energy, and water bodies can help reduce dependence on non renewable energy. By optimizing plant configuration, such as replacing lawns with forest land and using native plants to replace foreign varieties, energy inputs such as irrigation and fertilization can be effectively reduced, achieving a win-win situation for ecology and economy.

3.2.2. Reuse of waste materials

The reuse of abandoned materials such as building components, vegetation, and soil within the site not only saves resources, but also endows the site with new functions and meanings. Abandoned land that has undergone ecological restoration can be transformed into urban public spaces, enhancing its social value.

3.2.3. Cycle regeneration

The material cycle in natural systems is closed, but modern urban ecosystems often flow in one direction, leading to resource waste and environmental pollution. Ecological design should advocate for the circular succession of urban land functions, achieving a regeneration path from

ISSN: 3008-1394

abandonment to recovery, and enabling land to continue to play its value in urban evolution. [2]

3.3. Principle of Localization

Vernacular "originates from the Latin word" verna ", originally referring to slaves born in a territory, and later extended to localized, self occurring cultural expressions. [17] Rural landscape is a spatial adaptation form formed by local residents based on natural environment and survival needs, reflecting the lifestyle and value system of a specific region. [1] Its core features include adaptability to terrain and climate, creativity and survival orientation of local residents, all of which are indispensable. [18]

3.3.1. Regionality

China has a vast territory and diverse landforms and climates, which have created rich local cultures. The local landscape embodies the folk customs and styles of specific regions in historical periods, and is an important carrier of cultural identity and value judgment. [19] In the context of globalization, the inheritance and reuse of local landscapes can help maintain regional cultural characteristics and become an important design strategy to cope with cultural convergence. [20]

3.3.2. Aesthetics

Rural landscapes have distinct visual features and composite aesthetic values, combining natural and cultural connotations. Its natural beauty is reflected in ecological resources such as mountains, rivers, and water bodies; Humanistic beauty is reflected in the material and non-material cultural landscapes formed by traditional settlement architecture and folk activities. This unique aesthetic integration provides a profound cultural and visual foundation for landscape planning.

4. Methodology and Practice of Ecological Landscape Design

4.1. Ecological Governance and Restoration

The 2021 Global Risks Report points out that in the next 5-10 years, the main long-term risks facing humanity will be concentrated in the ecological field, such as extreme weather, climate action failure, ecological destruction, biodiversity loss, and resource depletion. This indicates that ecological governance and restoration have become key strategies for addressing environmental crises.

The traditional view emphasizes relying on the self-organization and self-regulation ability of ecosystems to naturally transition them to their primitive state. However, in the face of ecological degradation caused by long-term overdevelopment, relying solely on natural restoration is no longer effective. Therefore, the current more scientific approach is to integrate natural succession laws with necessary artificial interventions to enhance the efficiency and stability of ecological restoration. [24]

The renovation project of an abandoned sewage treatment plant in Denver, USA is a typical case. The factory was built in 1930 and abandoned for over thirty years, with aging facilities and severe pollution. The design team renovated the original industrial drainage ditch, rebuilt the embankment, and introduced local tree species during the restoration process. Combined with ecological restoration technology, the flood discharge area was transformed into a wetland system, and local plants such as poplar and willow were planted. This design not only improves the original water quality, but also reshapes the regional ecological landscape.

At the same time, the project retains some industrial structures and showcases their historical significance in a non explicit manner, making the site both ecologically functional and culturally

ISSN: 3008-1394

valuable, successfully achieving the ecological transformation of abandoned land and the regeneration of public spaces.

4.2. Ecological transformation and utilization

Zhongshan Qijiang Park is located in the center of Zhongshan City, Guangdong Province, covering an area of 10.3 hectares. The original site was the abandoned Yuezhong Shipyard, and the terrain has problems such as large water level fluctuations, deep sediment at the bottom of the lake, and unstable lake shores. The design team implements ecological transformation while respecting the industrial heritage and original vegetation of the site, creating an urban open space that integrates ecological restoration and cultural display.

To cope with changes in water level, a terraced planting system is designed, which constructs wetland terraces with significant height differences by setting up multiple retaining walls. Aquatic, swamp, wetland, and intermediate native plants are arranged according to water depth. This strategy enhances the ecological resilience of the site, attracts diverse birds and wildlife, and strengthens biodiversity.

In addition, a wharf system is designed above the planting platform to form a staggered sightseeing path with water level fluctuations, allowing the public to understand the dynamic characteristics of aquatic ecology while getting close to nature. Three months after the completion of the project, the planting platform has a stable habitat and abundant species, and the revetment structure adapts to water level fluctuations, demonstrating good ecological and hydrophilic effects. This practice demonstrates the path of revitalizing the ecological potential of abandoned industrial sites and promoting natural symbiotic urban renewal.

5. Conclusion

In the 21st century, ecological and environmental issues have received increasing attention, and the global rise of ecological concepts has prompted landscape planning and design to reconstruct their relationship with the Earth's ecosystem from a scientific perspective. With the improvement of public ecological awareness, modern landscape planning, as an interdisciplinary field, takes into account the development of ecological design practice, urban planning, horticulture and other theories.

Modern landscape design based on ecologicalism should follow ecological principles, respect biological laws, efficiently utilize soil, vegetation and other resources according to local conditions, prioritize the use of local plants and recyclable materials, minimize energy and resource consumption, and achieve the organic unity of ecological and social benefits.References

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