

Research on Ecology in Modern Landscape Design

Juan You^{1, a}

¹College of art and design, wuchang shouyi university, wuhan 430064, China

^ayoujuan_wh@126.com

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Abstract. Modern landscape design develops from germination in the early 20th century to contemporary mature, forms the scientific, artistic and social three aspects which supplement each other. Most landscape designers realize that the landscape no longer means “picturesque”, but must match society and science together to create more abundant value, involving every aspect of people’s life. Now, ecological socialism has become the inner essence that a landscape designer must consider, which includes respecting the natural development process, emphasizing species diversity, advocating energy and material recycling, maintaining plant environment and animal habitat quality, development of sustainable treatment technology and maintaining the nutrients and water cycle.

The modern landscape design and ecology

Landscape ecology is a new cross subject booming since 1970s, is a comprehensive interdisciplinary subject between ecology and geography, it is also a new branch in the field of ecology. It based on ecology theory framework, absorbing modern geography and systematical science, researching the landscape structure, function and dynamic, including landscape and regional scale of resources, environmental management and management issues with comprehensive integrity and macro regional characteristics, and to study on the relationship between the landscape structure and the ecological process. Since the late 1980s, landscape ecology has gradually become a hot spot of research in the world's resources, environment and ecological aspects.

A brief introduction

Ecology is a science the study the mutual relationship between biology and its surrounding environment (including abiotic environment and biological environment). Ecological landscape is multidimensional system consisting of the social, economic, natural and cultural compound ecological system including the natural landscape, the pattern of the economic landscape, cultural landscape, the multi-dimensional coupling process and function. It emphasizes on the harmony between human and space environment ecosystem, past, present and future urban development, and the symbiosis between heaven, earth and human harmony.

Ecology refers to all the biological state of being and the survival of any creature, which all needs a certain amount of space, matter and energy, not existing in isolation. They are closely linked to the living environment around, constantly cycle and flow between each other.

The design concept of ecological landscape is the important embodiment of adhering to the principle of sustainable development, is the inevitable developing trend of landscape design. Raising the level of ecological landscape design can improve the quality of life in the city, improve the urban environment and meet people's ecological requirements. Modern landscape ecological design is an important part of urban ecological planning. The modern landscape ecological design puts emphasis on the people-oriented and the concept of “ecological”. Modern landscape ecology is a kind of slogan and target. Sticking to the principle of sustainable development, raising the level of ecological landscape design are to solve the relationship between natural and artificial landscape, make the perfect combination in order to improve the quality of life in the city and improve city’s environment so that the human and the nature can be harmonious and unified. At the same time, landscape ecological design not only meets the spiritual needs of people, but reaches the energy cycle of natural materials from the perspective of ecology. This kind of landscape design establishes

the harmonious development of human and nature, and gives full play to the ecological benefits through using the land and the flow of energy and so on. You can see from the chart 1.

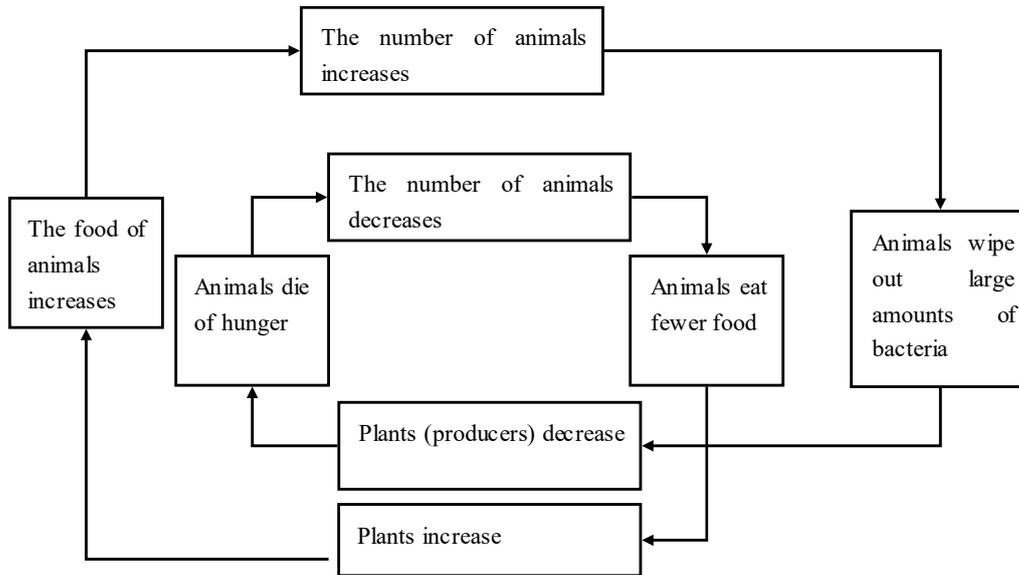


Chart 1: the relationship between animals and plants

The characteristics of the biological landscape design

Symbiosis between human and nature, the natural ecosystem provides necessary substances for human beings including air and purified water; reducing the influence of floods, water loss and soil erosion; regulating the climate locally; protecting species; maintaining the culture diversity; providing aesthetic and enlightenment wisdom in order to enhance the humanistic spirit and so on. In the ecological landscape design, what is extremely stressed is the relationship between human and nature. To protect people's natural environment requires that we learn to use the knowledge of the ecology, the landscape design of ecological function, efficient, recycling use of resources and avoid waste emissions at will.

Attaching great importance to the combination of regional culture and modern civilization, a city has different social cultural values, aesthetic, philosophical orientation and differences. Such kind of environment makes people feel the connotation of regional culture, so as to provide spiritual enjoyment, highlight the good society culture atmosphere. This feature gives full play to the social benefit, environment and cultural atmosphere to maximize an effective combination of ways.

American famous ecological design scientist, in his book design *Combined with the Natural*, put forward a clear direction for how to deal with the nature and landscape planning and design. He stressed that during the land use and urban planning and construction people should follow the natural intrinsic value and natural process, realize the harmony of man and natural environment. The natural ecological law is one of the fundamental basis of modern landscape design.

If the resource is an integral part of the city, then the non-renewable resources is the most important part. So if we want to make our survival environment long-term and sustainable development, non-renewable resources must be planned to make it be protected and reasonable recycle. So, we should also comply with the nature, find the law of renewable resources, use them again. The main object of ecological landscape design is human survival "home", namely the urban ecological system of human life. The landscape place as a part of the natural ecological system reduces the interference of ecological system. At the time of the landscape space design, it reduces the damage of nature to the minimum so as to maintain the natural ecological system integrity.

The resource conservation and the sustainable development are changing and developing with the landscape ecology principle. The concept of sustainable development has introduced to the ecological landscape design. The landscape design is no longer simply to build outdoor space to satisfy people's demands for activities and please to the eye, but in continuous harmony between human being and the environment.

The influences of biology on modern landscape design

The concept research influence

With the changing of social productive forces, science and technology, human values and way of thinking in different ages, on the relationship between man and nature, human showed different environmental ethics thoughts. Ecological thinking has become environmental ethics of the era. The ecology has the era significant world outlook and the moral nature. The modern landscape must be combined with the age and influenced by it. The concept of the landscape is always changing as people understanding the relationship between man and nature. Overall, landscape development has experienced the three stages; from the aesthetic concept, concept of geography to ecology concept.

“Landscape ecology” has expanded the traditional aesthetic category which only considers the visual aesthetic landscape concept of land. It regards all the landscape part as a kind of environmental impact factor (climate, geology, landform, soil, vegetation, hydrology, animal and human activities etc.), focusing on the interaction and balance between these factors. Simon van suggested that “any coordination with the ecosystem process mutually, making its damage to the environment minimize the impact of design form what is called ecological design.” We can use the method of ecosystem and language for the analysis of urban planning and landscape design. The following chart 2 is the structure of the landscape.

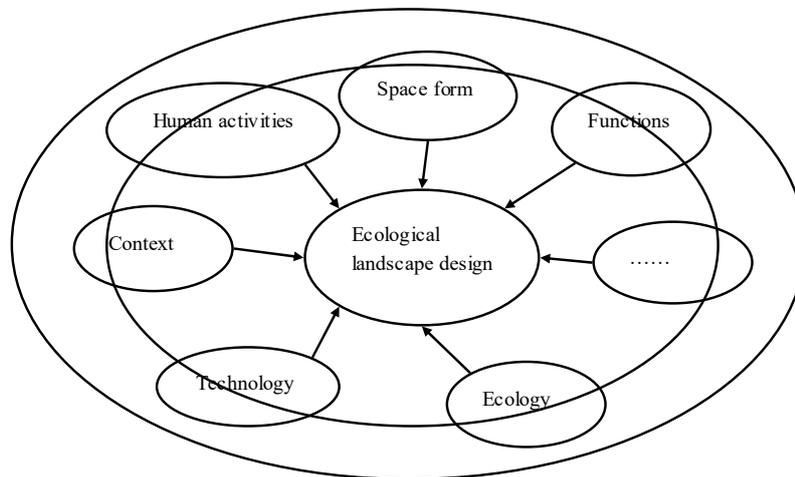


Chart 2: the overall structure of the landscape

The evaluation standard influence

Aesthetic activity has the characteristics of super utilitarian, subjectivity and sensitivity. As the aesthetic quality is the objective world as perceived scenery meeting the value attribute need of human aesthetic psychology. Under the contemporary ecological culture influence, the re-recognition of aesthetic phenomena shows it is not just a discovery of natural beauty, is also a value orientation of the ecological concept, transforming itself and the surrounding ecological environment and ecological processes as the aesthetic object and aesthetic consciousness, reflecting people’s internal nature and external natural harmonious unification relations.

Ecological thoughts

The functional principles of the modern landscape design are embodied in the ecological thoughts; functionalism is the primary goal of the modern landscape design; to meet the needs of the masses is the functional principle of the landscape design. The modern landscape design attaches great importance to the cultural sustainable development and ecological ideas. Only to continuously bring in new contents from the environment meeting the demands of the society can it change the structure of the system to make it be more adapted to the environment.

The design principles of the modern Ecological landscape design

Design principles of modern urban ecological landscape have the following four principles: nature priority, minimum interference principle, the 4R principle and regional principle.

(1) Nature priority principle

Ecological design is called to, as the name implies, use natural motility at maximum in the process of design and always maintain self-renewal and recovery state. Everything is for the benefit of the natural ecological priority conditions. The start point of ecological landscape design is to protect the environment, the ultimate purpose is to protect the sustainable utilization of the resources, energy, materials and environmental sustainable development, reducing emissions of waste water, waste gas, waste, and creating a good human living environment.

(2) Minimum intervention principle

Minimum intervention principle refers to achieve the best promoting effect with minimal intervention means. Landscape design with the ecological design concept is to do our best to put the negative effect on the natural environment and through a reasonable way to carry on the design, make natural system achieve the purpose of energy recycling.

(3) 4R principle

4R are “Reduce, Reuse, Recycle and Renewable.” Reduce the use of various resources; reuse original landscape components in accordance with the requirements of the project; recycle the establishment of recovery system, use the same materials and resources; the use of renewable resources, recyclable materials.

(4) Regional principle

Regional principle explains the differences of regional environment from different factors such as geographical environment, climate conditions. Whether it is a city or a small town, the first step in the design must be the first investigation and analysis on the characteristics of the local environment, and then to evaluate from the perspective of environment construction.

“A good landscape design concept should be derived by the place the place” this is the principle of modern ecological landscape design. Capture the necessary information as a basis for design according to the local history, the cultural and natural environment and combining with local natural climatic conditions and topography, truly adjust measures to local conditions. As far as possible using local building materials and plant to make the local environment character and ecological harmony preserved.

Summary

Ecological landscape design is not a simple project. In order to realize harmonious coexistence, development and co-prosperity of human and the nature, early deeply exploration and ecological environment survey are needed. It combines closely with tradition, science and art, science and technology, ecology and humanism, which create three principles of ecological landscape design, that is, respecting nature, respecting people, respect the culture. The “fundamental principle of landscape design is to adjust and apply to the system to another system, making the contrast things form a harmonious relationship resulting in a more advanced and unified order. The ecological landscape design is more closely related to people's lives. The development of modern city's construction is full of human ecological system and space structure design, not only creating a feast for the eyes of the outer space, creating a better living environment, but also is the coordinator in harmony with the environment, the collaborative evolution of man and nature.

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