

# The Sustainable Expression of Ecological Concept in the Urban Landscape Environment Design

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**Abstract.** Urbanization is an inevitable trend of development of human society, also the inevitable outcome of economic development and scientific and technological progress, while urbanization process in promoting the development of human civilization, also no doubt, urban landscape has been a corresponding impact. Urban environment has suffered unprecedented damage, the urban population density, traffic congestion, shortage of resources, environmental pollution, ecological degradation, has become the focus of human society. In order to create an environment of ecological and harmonious, beautiful, sustainable development in the urban landscape, This paper discusses the concept of ecological design combined with the urban landscape design and sustainable development of urban landscape design.

## 1. Introduction

With China's accelerating urbanization, urban landscape structure has been affected accordingly. City environment suffers unprecedented hazards, such as urban air pollution, shortage of water resources, high population density, urban traffic congestion, shortage of resources and so on. This series of questions cause the natural beauty of the city less and less, and the ecosystem of urban landscape is also seriously deteriorating. Landscape embodies human outlook, values, ethics and moral and reflects people's love and hate, desire and dreams in the land. Today, landscape has become an indispensable part of modern urban life<sup>1</sup>.

Mencius said: "kiss and Jen, Jen and loving things." which fully demonstrates the ecological ethics that we should cherish all things and the spirit of treating things kindly. From the perspective of modern people, we are supposed to protect environment in accordance with the laws of ecology in order to ensure sustainable development. The design of ecological landscape and city reflects a new dream of human being-from the New Harmony Industrial Estate advanced by Owen, a pioneer of the socialism, to Howard's Garden City as well as eco-cities and sustainable cities rising in the late 20th century. These all show our pursuit to nature and culture, environment and design. As a landscape designer, how can we create a relatively harmonious, perfect and sustainable development modern urban landscape?



## 2. The Related Concepts

### 2.1. On the Ecological Concept

Di•Simon •Van Ryan (Sim Van der Ryn) and Stuart•Cowan (Stuart Cown) first proposed the definition of ecological design: any coordination with the ecological processes, as far as possible damage to the environment of their reach minimal design in the form, are referred to as eco-design. This coordination means that the design respects species diversity, reduce the deprivation of resources, maintaining nutrition and water circulation to maintain plant and animal habitats, habitat quality, and help improve the living environment and the health of ecosystems. Ecological planning and design as a natural part of the human and fully respect the laws of nature, follow the 4R principle - reduction (reduction), re-use (reuse), recycling (recycle), renewable (renewable), it is the most important of circular economy The practical principles. Ecological planning and design focus on promoting recycling and sustainability<sup>2</sup>.

### 2.2. The Concept of Sustainable Development

Sustainable development is a new concept of development in the 80s of 20th century. It is proposed as the changes of the times and development of society and economy. Sustainable development aims at meeting current needs without compromising the ability of future generations meeting their development needs. Sustainable development also means the maintenance, rational use and improvement of the natural resource base which supports the pressure resistance of ecological basis and economic growth<sup>3</sup>.

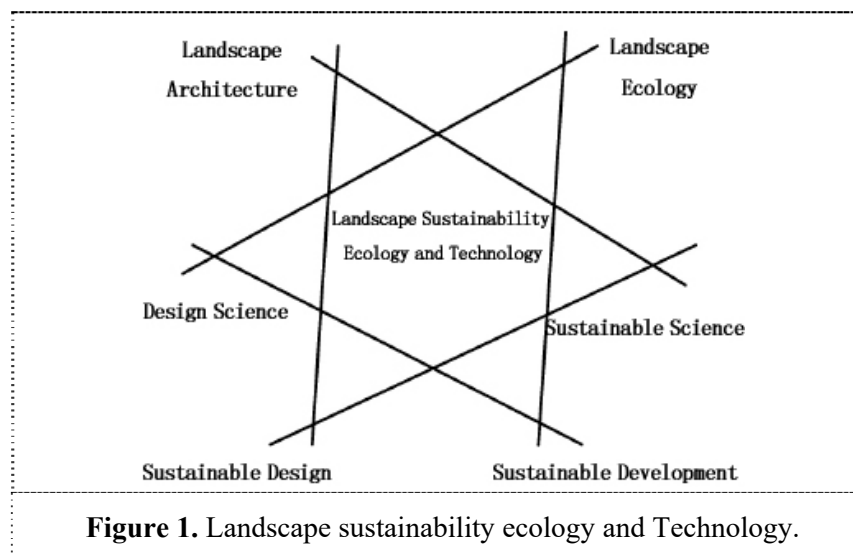
Since last century, people have gradually realized the drawbacks of traditional production methods, a high consumption of natural resources and over-consumption of human being, which we have paid a heavy price for. So sustainable design came into our view. The sustainable design is essentially a regenerated design based on a self-renewal capacity of natural systems, including how to interfere and destroy the self-regenerative capacity of natural systems as little as possible, how to enhance the regeneration capacity of damaged landscape as much as possible, and how to minimize a design by means of maximizing the natural regeneration capacity. These lead to a sustainable landscape.

## 3. Analysis Application of Ecological Ideas in Urban Landscape Design

As the theories of ecology and landscape ecology have improved steadily, and to a great extent guide practical urban landscape. Landscape designers follow ecology of landscape, focus on long-term interests of mankind, and respect the natural development process to create relatively perfect landscape works. Although a landscape design is penetrated more and more ecological thinking into the planning framework, there is still no good enough mixture between them. After 80th of 20th century, it is made up by landscape ecology which mainly studies the relations among landscape elements (ecosystems) and the overall structure, function and changes of landscape so that landscape ecology can develop rapidly.

The modern eco-landscape design is made according to all kinds of landscape elements of whole ecosystem and their coordination. To optimize ecosystem as much as possible in landscape design is the ultimate goal of landscape design. From a more profound sense, ecological landscape design to maximize the use of nature and to improve regeneration capacity of nature system<sup>4</sup>.

The current fact is that we face shortage of natural resources, scientific and technological level fails to give adequate support to eco-design, and thus eco-design can not completely replace the conventional design. Some designers can not grasp the essence of these advanced concepts but copy some western works, or piece some obscure things together and then give some strange ideas into it, naming it "eco." This makes people misunderstand ecological landscape design. Even worse some designers choose to change river way and damage the river's ecological system, which leads to biological disappearance and natural landscape destroyed. Ecological design regards nature the teacher of human being. From nature, we can sum up laws so that the landscape design is more reasonable<sup>5</sup>(figure 1).



**Figure 1.** Landscape sustainability ecology and Technology.

### 3.1. The Method of Ecological Design

#### 1) The retention and re-use of the site

Fully respecting original appearance of the site, retaining its original elements and reusing the original material not only save handling materials and avoid producing, processing and transporting those materials but also reduce the destruction of the ecological environment. For instance, Richard•Harder designed Gas Works Park in Seattle. When maintaining the original appearance of the site, he optionally kept the old industrial equipment of the base. Some gas and hydraulic pressure equipment were painted with red, yellow, blue, purple and other bright colors, and some were covered under a simple sloping roof and became a game room equipment. Industrial facilities and plants were constructed into restaurants, restroom, children game places and other facilities. These industrial equipment thought ugly and dirty are highly praised and regain a high aesthetic taste and social value after the transformation.

#### 2) Priority to recycling materials and Eco-efficiency

Based on local materials, promote the use of green materials. Strive to find a durable, locally produced, low-maintenance, and low-consumed materials.

#### 3) Conservation and protection of energy

We can reduce the consumption of non-renewable energy sources as much as possible through science and technology, and widely use renewable energy in nature such as solar, wind, etc., to adapt to modern ecology environment. Take Germany Berlin Potsdam Square as an example. Its ground and roof of the buildings there are set up a special rainwater recycling system. Collected rainwater can water the plants on the square, add water in water features and clean the interior of buildings and so on. It is very effective use of natural rainfall, saving water resources.

#### 4) Waste recycling

Create a virtuous cycle of terrestrial ecosystems. Transform the "waste" mold into a new landscape through the recycling of materials and resource and thereby minimize the demand to new materials as well as reduce the demand of energy required for production of material obtained.

### 3.2. Combination of Eco-Design Combined and Urban Landscape Design

Based on the methods of ecological design mentioned above, designers should pursue to maximize the combination of design and environment rather than only one of them. In the actual urban landscape designs, landscape ecology and construction optimize landscape pattern and process, reducing Urban heat island effect, water resources consumption, water environmental deterioration and global warming and so on. As excellent contemporary landscape architects, we should avoid designing only for design and try to make full use of the original elements of nature. But we can not be shackled by the natural elements. In our design, we do our best to use renewable raw materials and reuse the

materials on the site, maximizing the potential of materials to reduce production, processing and transport of materials and reduce construction waste, and retain some characteristics of local traditional culture (figure 2).



**Figure 2.** Sustainable urban landscape design in China.

Eco-design methods have been adopted by more and more designers. Eco-design methods are diverse, but every method in practice have different characteristics. We can make our design more ecological by these eco-design methods. We may maximize the use of the original elements on the site, respecting the original buildings and facilities and give some new features to them. Efficient use of water to reduce water consumption is common in ecological planning and design. In some urban landscape design, gathering rainwater or dew to supply most of the landscape water, add water to the surrounding waterscape and supply buildings with clean water, etc., so that the city achieve zero water consumption. Or we can adopt various natural purification mechanisms like artificial wetlands. Water flow and the growth of aquatic plants are associated with water purification, so that the landscape is ecologically rational integration of the principles.

The rich plant resources are also an important element that can not be ignored. In urban eco-landscape design, when designers choose plant material, shapes are very important. You can attract people's attention by designing a variety of forms of plants and let people benefit from nature. In plant design, grass plot and ground cover plants lie low and stretch without a break making our space full of vitality and endless green.

### *3.3. The Sustainable Development of Urban Landscape Design*

Ecologically, sustainability is taken seriously in order to balance natural resources and its development thereby protecting and strengthening the production and updates of environmental systems. We introduce the concept of sustainable development into urban landscape design to expand the area of landscape design but not just stay in the traditional design concept. Although from external appearance perspective, many landscape have more or less embodies the green, but the green is not necessarily the ecological, to spend a lot of manpower, material and financial resources in order to form and maintain the effectiveness of the landscape, not ecological sense of "green". Design should apply more native plants, respect the field on the original natural regeneration vegetation. Nature will have its evolution and update the rule, from ecological perspective, natural communities was higher than artificial communities more healthy, more animated. Some designers realize it, and in the design or make full use of the base of the original natural vegetation, or set up a framework for natural regeneration process, provide the condition, it is also played natural systems initiative a reflection. Judging from the scale, the landscape within a pond, a small woods, a brook can also be regarded as ecological system, From the large scale look, a forest as a forest ecosystem, a piece of waters as a wetland ecosystem, a water as a wetland ecosystem, . On a scale of landscape planning and design to consider and achieve the objectives, is using the ecology principle makes each ecosystem internal structure and material and

energy flow as far as possible to a dynamic equilibrium, and at the same time with adjacent ecosystem keep organic connection. Any landscape, especially the urban landscape system, with the most closely related is human itself. Concept of sustainable development requires caring for people first, respecting for nature and thus the blindness of artificial modification of the natural environment is reduced, which precisely embodies the concept of ecological planning; at the same time, we should pay attention to specific regional characteristics of the environment. When we create landscape design, we should avoid damaging original ecological environment and respect biological and ecological needs in the environment after fully understanding the ecosystem characteristics of the landscape. Secondly, in process of urban landscape design, we protect and make use of natural resources. We maximize the use of natural green energy, reduce the use of pollution energy, and reduce environmental pollution. Overall, the concept of sustainable development of landscape design requires us to take eco-development as basis and respect for the ecological environment, strengthening recycling of the material and energy, strengthen using self-sustaining and sustainable environment processing technology. In fact, the process of urban landscape ecological design is also the process of sustainable development of urban landscape. They integrate with each other. Their design intents are same. The sustainable development of urban landscape design represents a design method of respecting objective environment and using green techniques. When creating a green environment, we should express original beauty, namely, a deep harmony of human, biology and nature. Sustainable urban landscape design emphasizes on harmony and unity of nature and society. As art works, urban landscape design respects nature and matches the requirements of ecological development. In addition, it also improves the visual environment of a region, thereby enhancing the value of entire region and closely link with the social economy. Landscape design concept of sustainable development requires us to seek a balance between these factors, with both the rational use of landscape features of its own, but also good ecological and economic benefits of landscape, that is, the harmony and unity of nature and society.

#### **4. Conclusion**

Ecological design is the design we can achieve. It is closely linked to our daily lives, even the continuation of our civilization. Protecting the natural ecological environment and promoting sustainable development of the human environment has become our urgent task. Looking forward to the ecological landscape design in urban planning having better prospects, we will make unremitting efforts. The natural ecology and humanistic environment for the right amount of deconstruction and combination, urban environment design is always full of life and vitality of the construction form and realize the transformation and optimization of the urban space, only is the foundation, we must through the protection of ecological value and cultural value of the project and mining, guide the project and the surrounding area to a virtuous cycle, not only to enhance comprehensive benefit of business, but also to achieve ecological ideal in the construction of urbanization, achieve valuable historical and cultural site memory alive, designed to find the best position in the historical coordinate of urban development. In short, urban design needs to adhere to the view of ecology and culture, with the least damage to the site of the original ecological environment based on local conditions construction, inheritance historical context, regional development to push forward, through the mining of ecology and culture, to create a harmonious coexistence of cultural memory and the trend of the times of the urban space.

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