

# Viewpoints, Thoughts and Solutions to the Urban Landscape Design from the Perspective of Ecological Civilization Framework

## A Case Study of Urban Landscape of Wuhan

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**Abstract**—The arrangement and sum-up of thoughts, viewpoints and theories on ecological civilization provides reference for thoughts, methods and strategies in urban ecological civilization construction. In consideration of the domestic and foreign achievements on landscape ecology, and in combination with the current situations and existing problems in urban landscape design of Wuhan as well as the problems remained in history, a complete systematic legal system and systematical methods, measures and strategies must be established in the planning and design for the protection of cultural heritages and of ecological wetland of lakes and rivers, so as to provide a effective legal protection measure for landscape design in the ecological civilization framework and provide strategies for the management and planning of the government.

**Keywords**—composition of ecological civilization construction; ecological corridor system; urban ecological civilization construction; ecological infrastructure

### I. INTRODUCTION

Combining with the study subject of Hubei humanities & social sciences which is *Discuss on the Urban Landscape Ecological Civilization Construction- A Case Study of Wuhan* (No.: 15G183), the author conducts a brief analysis on the viewpoints, thoughts and solutions to urban landscape design from the perspective of ecological civilization framework which is mainly manifested as follow: (1) main idea; (2) important viewpoints and thoughts to solve problems; (3) solutions and suggestions on the ecological civilization landscape design; (4) academic value, practical significance and social impact.

### II. MAIN IDEAS

#### A. The Systematic and Fundamental Study on Landscape Ecology is A Component of Ecological Civilization Construction and the Foundation of Urban Ecological Civilization Construction.

Systematic and fundamental study on landscape ecology: (1) substrate- patch- corridor theory; (2) greening, bearing capacity, waterscape, species, biodiversity and ecological

corridor; (3) group landscape design (including landscape design in residential districts, landscape design by lakes, landscape design of parks, landscape design in commercial zone and landscape design of enterprise and public institutions); (4) green landscape elements: rain gardens, street design, roof gardens, brown field transformation design; (5) frame system of landscape components: green ecological corridor, ecological network, ecological infrastructure, green corridor system; (6) methods for ecology landscape design: reduction in design, green ecological corridor, ecological network construction, species and biodiversity.

The urban ecological civilization construction of Wuhan is a system. Whether the urban greenways in Wuhan possess continuity, integrity and connectivity is the important index for the formation of urban ecological civilization construction. And the key point is to cultivate ecological corridor and ecological network system and form the diversity of organism and continuity and systematicness of ecosystem. Accomplishing the construction of ecological infrastructure is the foundation for maintenance of urban ecological civilization. The key point of urban ecological civilization construction is to cultivate ecological corridor system and ecological network system and form the diversity of organism which is the foundation for maintenance of urban ecological civilization.

#### B. The Establishment of the Spirit of Ecological Civilization and the Legal Construction

As the result of faster urbanization of Wuhan, the living standard of people is declined; the floor area ratio of residential district is risen; the water resource is polluted and the environmental quality is also declined. The integrity of urban ecological civilization lies in fairness, beauty and ecology. If there is no guarantee of ecological legislation and legal system, there will be no permanent sustainable development.

#### C. Main Thoughts on Project Study

The key points of ecological civilization are greening and energy-saving and emission reduction. From the perspective of landscape ecology design, the thoughts for solving problems shall be sought from the orientations of ecological design and

energy conservation design, etc through the systemic design of landscape.

### III. SUMMARY OF LANDSCAPE PROBLEMS, MAIN VIEWPOINTS AND COUNTERMEASURES OF ECOLOGICAL CIVILIZATION CONSTRUCTION OF URBAN LANDSCAPE

#### A. *Summary of the Problems Needing to Be Settled Urgently in Ecological Civilization Construction*

The formation of ecological civilization needs to be planned through the whole landscape of the city, mainly through the construction of green ecological infrastructure. For the planning and construction of the city are in constant change, therefore, the Brownfield landscape design can be carried out through maintaining, constructing, restoring and improving the original river, lake and mountain ecology, along with protecting and continuing to use traditional historical relics and old industrial construction facilities. Maintain, restore greenways, seal up the lake shorelines, construct ecological wetland parks, and build rain gardens along the urban streets; increase or build new urban parks in accordance with the urban construction area and population proportion; treat the city planning as law, and construct residential landscape, plan greening area, construct rainwater collection facilities and construct rain gardens in accordance with the requirements of city planning and construction; pave all of the city streets and parking lot, etc with high permeability grid ground tiles, so as to reduce the flushing of the rain flood and the instantaneous peak; strengthen and guarantee the stability of the existing mountains and the cover area of the current forest green space of the city, such as protecting and maintaining the mountain terrains of Snake mountain, Tortoise mountain, Xiaohong Mountain, Luoia mountain, Yujia mountain and Guizi mountain, etc; construct, restore and improve the greening coverage of the trees, brushes and grasses and the existing ecological plantation, so as to form diverse seasonal aspect changes, in addition, dismantle, reduce the buildings and control the development and the height of the buildings. Combine ingeniously with the historical and cultural relics of Wuhan city, such as the Hubu Lane, the Mao Zedong National Institute of Peasant Movement, the Red Tower, the Xinhai Revolutionary historical memorial museum, and the historical rental buildings near the Hankou River Beach, including the buildings such as Wuhanguan on Nanjing Road, along with the Soviet Russian historical buildings of the 1950s and 1960s, the historical buildings along the Tanhualin Street, including the old residence of Qian Zhongshu's father Qian Boji, etc, the red office and residence buildings constructed by Wuhan Iron and Steel (Group) Company in Qingshan District, etc, all of which jointly form the overall historical context of Wuhan city, in combination with the mountains and rivers and the greening of Wuhan city, it forms a complete cultural city with ecological civilization ideas.

#### B. *Main Viewpoints and Solutions of Ecological Civilization Construction of Urban Landscape*

The construction of corridor, species and biodiversity: (1) Patch-corridor-substrate mode; (2) Form corridors; (3)

Maintain species and the low cost of species; (4) planted in large area; (5) Create a biodiversity environment.

The construction of green ecological corridor and ecological network: Green space ecosystem planning and construction technology based on natural landscape, biodiversity and cultural landscape. The greenways form a green network system, which connects the ecological elements in the ecosystem network into a system and makes the ecological elements infiltrating with each other.

The establishment and protection of green space ecological corridor: The foundation of the formation of ecological network is to form the network system through the connecting of the landscape node corridors and form a self-sustaining circulated ecosystem. The ecological network system is established on the basis of land suitability analysis.

The ways to reduce design and construction: The effective use of resources not only includes the protection of land, forest, farmland, wetland and waterfront, but more importantly, the understanding and effective retention of the urban landscape venues in Wuhan, such as the retentions of the areas of the urban lakes, the mountains and forests along with the farmlands, etc, so as to achieve the effect of more with less, the principles of design are less removal, less transplanting of the original site plants, less lawn pavement, less rigid pavement, less water and less electricity, so as to reduce the impact on the overall environment, and achieve the design that makes the most effective use of the resources and integrates with the nature.

The maintenance of local natural landscape: The natural landscape is the original foundation of the whole ecological network, which includes the plants and animals and the natural environment, such as mountains, rivers, lakes, farmlands, forests and wetlands, etc, which is the original system that can generate energy flow and material flow through sunlight, which provides the foundation for human survival. The destruction and reduction of the natural landscape in the cities and towns and their peripheries will cause major hidden dangers to the urban ecological security, therefore, the green space ecological network plays a very important role in the protection and restoration of the natural landscape network system.

The maintenance of local natural environment requires a certain area of nature itself and the integrity of the system, presenting as that the area of the river and lakes cannot be reduced; the mountain volume and the greening area cannot be reduced; the corridors are connected as a whole. It is recommended that the natural landscape extends and spreads naturally along the water areas.

### IV. THE THOUGHTS AND SOLUTIONS OF ECOLOGICAL CIVILIZATION CONSTRUCTION

#### A. *The Thoughts of Ecological Civilization Construction*

The construction of green ecological corridor system: First, the landscape patches need to be protected, in Wuhan, these patches or in other words the nodes in the overall ecology, refer to the central conservation areas as ecological nodes that

can be clustered such as natural reserves, national parks, cultural monuments, scenic reserves, riparian areas, lakeshore areas, flooded areas, river buffer areas, watersheds and ridges. Second, the natural ecological nodes in Wuhan also include some scenic areas equipped with infrastructure such as the East Lake Park, Moshan Park, Yellow Crane Tower Park, Hankou River Beach Park, Liberation Park and Zhongshan Park, etc, along with city parks with a certain scale and water areas such as lakes and riverways, and wildlife reserves, golf courses and so on.

### *B. The Solutions of Ecological Civilization Construction*

The construction of ecological civilization parks: As an important civic leisure entertainment place, firstly the park need to be a place to meet the functional requirements of the people, and the ecological function of the parks is the reason to attract people. There should be new parks in the new development areas.

The control the development of hard ground and land for construction in park system is in favor of the greening and ecological benign cycle of the park system.

Scientific management and control, as a city park, it is important for city residents to have recreational activities or entertainment, namely the involvement of recreation. The bearing capacity of the parks has a limit, and the visiting of a large number of tourists will inevitably bring certain damage to the plants of the city, for example, the grass in the park will be damaged from being treaded on by visitors, and some trees will be damaged by the morning exercisers who may flap or kick a tree for a long time; the number of visitors need to be restricted within a certain extent. As a city park, the tree transplant, water pollution and revetment hardening in the park need to be controlled. In regard to the water areas such as river and pond, the river bed and revetment can't be hardened for the purpose of constructing project and making money, which will reducing the wetland plant ecological process and the living space of the amphibians, and the damage of the ecological process will cause the decline of the park ecological quality and natural quality.

The construction of roof gardens: A roof garden is a garden green space that is opened up on the roof, platform, balcony or windowsill, which makes full use of the garden making elements such as plants, micro topography, water body and small garden ornaments. With the help of garden making techniques such as borrowing view, compositing view, pointing view and blocking view, gardens with different use functions and characteristics can be created. The coverage of a roof garden is generally between 50%-70%. With the help of the parapet wall, flower stand, rockery, flower wall, wall column and architecture articles, etc, a greening coverage of 80%-90% can be achieved.

In respect to the old house roofs or roofs without high demand, which are restricted by the factors such as roof waterproof and bearing capacity, light roof-greening demanding low management can be made on them. After the bearing structure reinforcement and waterproof layer repair are completed, the medium-size or mixed roof greening design can be made on the old roofs according to actual situation.

The construction of rain gardens: The rain gardens can be built on either sides of the city streets or in the vast city blocks such as the residential quarters, city squares, commercial areas, warehouse areas and government office areas. The rain gardens extend along the streets in the vast outdoor areas and make full use of the rain and snow, generally the rainwater on the roads, and through reconstructing the curbstones on the two sides of the roads into interval sections that can be permeable or with gaps, the rain-flood runoff on the roads can flow into the surrounding green spaces, so as to water the soil of the growing areas. The canna, calamus and iris are recommended to be planted in the rain gardens. The excess rainwater or the rainwater overflowing at a certain height will flow into the reservoir through the underground rain flood pipe network. The water in the reservoir is used to water the plants during the dry weather; more excess rainwater will flows into the rivers and lakes through rainwater pipe network system, which will reduce the concentration of rainwater runoff caused by the large area of reinforced concrete ground, and resolve the problems of large area of soil thirst and water supply of the plants and purify the rainwater pollution.

The natural landscape construction of brownfield area: Natural landscape construction of the Brownfield area, such as the industrial and mining area, coke-oven plant of Wuhan Iron and Steel (Group) Company, areas in front of the factory, etc. Sewage treatment and soil improvement should be carried out to increase fertility in the abandoned industrial and mining plants. Care and take conservation of breeding plant species by means of conservation of encompassment community habitats and establish the ecological network system of plants by these. For the treatment of municipal sewage in Wuhan City, we should establish more sewage treatment system to reduce the sewage directly discharged into the river.

For Brownfield land protection, there is no need to tear down all the factory buildings and structures, and this is totally unnecessary. Due to the continuous expansion of the city, new parks should be considered. In this way, Brownfield land should be a part of the increased new parks. The old factory buildings do not have to be pushed over completely. Some real estate residential areas have been developed and reserved part of the former sites and they have become the history of culture and architecture, which has added cultural connotation and interest.

The original buildings and native plants should be respected in the old industrial areas. Fully protect nature or do well in natural restoration, reduce pollution emissions, reusing, recycling and so on. Make full use of nature to do more work and promote ecological civilization.

The construction of ecological civilization of residential landscape design: Ecological civilization construction in residential areas need to do well in permeability design and rainwater utilization design by making full use of local materials, local plants and water resources; need to make full use of green resources to enhance ecological effect, purify air and degrade soil and water pollution; need to make full use of solar energy to enhance the family needs of ordinary power supply and bath needs.

The measures and countermeasures of ecological infrastructure construction: The root of ecological infrastructure construction is to pursue the overall and continuous ecological environment of a city's virescence, namely to protect the city green line, purple line and blue line, namely to protect the green vegetation corridor. To protect the architectures in historical and cultural sites of the city; to protect, maintain and restore the urban water system, and to make them free from construction waste and environmental pollution.

### C. In the Landscape Design of Ecological Civilization Construction, Legal Mean Must be Established and Used

1) *Right is Greater than Law, Leadership is Government:* All the time, we deny the existence of individual and the living environment of human beings because of thinking highly of people-oriented or that man can conquer nature and emphasizing conquering nature, paying too much attention to the development of economy. Only focus on production and economy development and lack of laws and regulations for environmental protection and ecological development, especially lack of corresponding law enforcement because of right is greater than law, leadership is government and lack of corresponding awareness of environmental protection for a long time. The planning of real estate often appears in the situation of "regulation three and construction five". Compress green area and other infrastructure area, expand the real estate area. In short, that is no law enforcement in construction planning, and planning is not implemented as law.

2) *Planning is Legislation:* Society and government should introduce corresponding economic, legal and institutional measures to build ecological civilization in addition to treat planning as a law. In terms of the legal system, all kinds of environmental pollution, deterioration of landscape and violation design need to be implemented through legislation and law, only in this way, ecological civilization can be maintained and stabilized.

### V. ACADEMIC VALUE, PRACTICAL SIGNIFICANCE AND SOCIAL INFLUENCE OF ACHIEVEMENTS

The research findings of *Discussion on Construction of Ecological Civilization in Wuhan city -- taking Wuhan city as an example* provide academic value, practical significance and social influence for the construction of ecological civilization in Wuhan city. The main features are as follows:

Ecological Civilization is a Systematic Project: The focus is on planning, controlling total emission, reducing pollution emissions and strengthening the recycling of substances and energy.

Focus on the construction of ecological infrastructure: Due to the great changes in urban construction, the ecological infrastructure is relatively stable. Therefore, the construction and stabilization of ecological infrastructure is an important means to the ecological civilization. Therefore, the construction of ecological civilization must be based on

ecological green infrastructure and must be guaranteed by planning and law, so as to form a sustainable ecological civilization to benefit future generations. Only by implementing the strictest system and the most rigorous rule of law can we provide reliable guarantee for the construction of ecological civilization.

The key points for the construction of ecological civilization in Wuhan City: The construction of ecological civilization in Wuhan city should fully respect for the laws of nature and the use natural to work and focus on using green plants and the natural to make ecological environment transformation under the condition of facing the construction actuality of urban landscape in Wuhan city. To structure harmony of justice, beauty and ecology of urban ecological civilization by using of rain gardens, parks and greenery, biodiversity, and green ecology infrastructures; the construction of ecological civilization needs to be protected by national legislation and law.

The significance of ecological civilization construction of landscape design in lake landscape and residential area: As a complex ecosystem of residential waterscape, residential landscape must be based on the realization of ecological value. Ecological principle should be reflected in the design and cannot take sacrifice our livelihood ecological environment as a price. Therefore, the landscape construction along the lake should not destroy the environment and sacrifice the ecological civilization. The ecological civilization construction of residential areas and lakes should create a variety of landscape and living entertainment places to let Wuhan citizens fully enjoy the happiness of lakes and let the lakes develop in the direction of nature and ecology.

### VI. CONCLUSION

For the ecological civilization construction in Wuhan city, we should build an ecological security barrier firmly and insist on the priority of protection. Take natural recovery as the main factor, implement the ecological protection and restoration project of the mountains, forests, paddy field and lakes, carry out large-scale urban greening action, perfect the protection system of natural forest, carry out the renovation actions of Lakes and river bend and use the strictest environmental laws as safeguards.

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