

# Study on Green Space in Hubei Province from the Perspective of Landscape Ecology

## A Case Study of Wuhan\*

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**Abstract**—Based on the perspective of landscape ecology, in this paper, the development law of green space of urban fringes, human needs and spatial characteristics are implemented in the practice of material space. The dynamic development law of green space in urban fringes and the characteristics of land use expansion are adopted to further implement the green space in the urban fringe of Wuhan as an empirical study of the existing problems of green space in Hubei Province and to carry out research from the perspective of ecological priority.

**Keywords**—green space; problem; landscape ecology

### I. INTRODUCTION

The study area is located in the east of the Jiangnan Plain, both sides of middle reaches of Yangtze River, the junction of the Yangtze River and the Han River. The area is one of the largest cities in central China and one of the seven central cities of China. Seeing from the time axis, the focus of urban space growth in Wuhan is gradually shifting from the central area to the fringe area, which is an inevitable trend of the development of the urban green space. The expansion of urban green space in Wuhan shows a law: from small to large, from slow to fast, which is the result of the system and also the law of the city development.

### II. MAIN PROBLEMS IN THE DEVELOPMENT OF GREEN SPACE IN THE URBAN FRINGE OF WUHAN

Seeing from the perspective of landscape ecology, it can be concluded that the self-circulating system of holistic ecological effect has been destroyed and the development of human and nature is not coordinated; seeing from the macroscopic perspective, it is about the problem that green space encounters the problem of “external expansion and internal contraction”, natural patches are reduced, elements are chaotic and fragmented; seeing from the micro level, the quality of green space environment is poor, the function is imperfect and the regional cultural characteristics are absent.

#### A. *The Self-circulating System of Ecological Effects Has Been Destroyed and the Development of Cities and Nature Is Not in Harmony*

Unlike the ecosystems of cities that depend heavily on the outside world, the fringe area plays an important role in the development of the city due to its unique geographical scope and content elements, and it also provides the elements and functions of the landscape ecology to the city continuously. The interior of which correspondingly forms the circulatory system of the ecological effect. At the beginning of the formation of the fringe area, the influence of man-made activities is small, and the ecosystem can reach the self-circulation state and become the ecological hinterland of the city under the interaction and balance of the internal ecological elements.

In recent years, under the pursuit of economic benefits, the function of industrial production in the fringe area of Wuhan has been strengthened, but the ecological function has been ignored. Too many human production activities and life activities transform the material space of the fringe area, and also change the self-circulation system of the ecological effect of the original fringe area. In this reality, the ecological environment of the fringe area of Wuhan has been greatly destroyed, the ecological elements of the internal landscape have been eroded and swallowed, and the original self-circulation system of the fringe area has been destroyed. In this way, it is difficult to maintain the operation of the ecosystem in this region, and it is impossible to provide support for the ecological effect of the city, which makes the relationship between man and nature unable to reach a harmonious state in the urban development of Wuhan.

#### B. *Green Space Encounters “External Expansion and Internal Contraction”, Natural Patches Decrease, and Fragmentation Is Obvious*

While the urban fringe area is constantly developing and changing, the green space also presents the dynamic characteristics. Although it expands with the development of the fringe area, because of the rapid pace of the construction of the fringe area, its expansion cannot keep up with the growth of construction land. However, under the condition

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that it is difficult to expand construction land for a short time, the large demand for construction land has shifted to the encroachment of green space. Therefore, green space, woods, fields and river systems have encountered the phenomenon of “external expansion and internal contraction” to varying degrees.

This phenomenon is accompanied by the rapid reduction of natural landscape patches, a large number of construction activities transform the natural environment. The change from the natural landscape patches to the artificial landscape patches is very obvious. The original positive ecological effect is transformed into the negative ecological effect from the periphery and the existing natural landscape patches, which leads to the imbalance of the ecosystem.

As a whole, there is no relative relationship between the elements of the artificial landscape and the natural elements in the fringe area of the Wuhan city, and the degree of freedom is higher. Compared with the built-up area, the fragmentation degree of land-use landscape, especially natural landscape, is higher. Apart from the partially built planned artificial landscape, the others are basically distributed in natural spots and patches, and there is no regularity of layout. At the same time, compared with the artificial elements, although the natural elements have been in the leading position, there is still a certain integration space within them, with certain coupling and transformation capabilities.

*C. The Proportion and Distribution of the Elements of Green Space Landscape Are Out of Proportion and Scattered, and the Regulating Effect of Natural Ecology Is Declining*

Seeing from the relationship between the distribution of landscape elements and population, the green space of the fringe area of Wuhan is the main area of the growth of the agricultural population. There is not only the rapid growth of natural growth, but also the mechanical increase of the large population, that is, the spread of the urban population and the accumulation of the foreign population. At the same time, the green space in the fringe area of Wuhan is also the fastest-growing area of its urban and rural construction. The diffusion of elements and functions of artificial landscape and the development of industrial production in fringe areas occupy a large amount of cultivated land in green space, which causes the irreversible rapid loss of natural landscape resources, thus seriously misbalancing the proportion of population and cultivated land landscape, and gradually deteriorating the relationship between human and nature. Since the reform and opening up, the continuous rapid reduction of cultivated land area in Wuhan reflects this feature.

*D. The Environmental Quality of Green Space Is Poor, Its Function Is Imperfect and Its Regional Cultural Characteristics Are Absent*

The green space in the urban fringes is evolved from the rural regional space in the urban development. When a large number of floating people gather here, all kinds of resources

are needed here, so the pollution is aggravated and environmental problems follow. The lack of sanitation facilities and the poor infrastructure lead to the poor environment of green space in the fringe area and further lead to the decline of the quality of life of users.

There are a large number of relics of historic culture in the green space of the urban fringes, such as natural landscape or human landscape, or both. These historical legacies are testimony to the development of the city. However, driven by a large number of development and construction and economic interests, these precious historical relics are neither properly protected nor effectively utilized. If these conditions are not improved, with the rapid development of the urban fringes, these historical and cultural landscapes will eventually be destroyed and disappeared, and they will no longer exist in the rapid evolution of the urban fringes.

Wuhan is a city with rich historical and cultural heritage. Many historical sites are distributed in the fringe area of the city; driven by the factors of interest, it is often hard for the municipal government to completely preserve these historic sites. In addition, in the fringe area of Wuhan city, the traditional local culture also faces the risk of gradually dying. The rural landscape is beginning to converge to the urban landscape, and the homogenization is becoming more and more serious. The cultural loss of the industrial area is the most serious. In the survey, it can be seen that there are out-of-order small commercial centers, and fields and settlements are around the industrial area. The new modern architecture and the local landscape make nature and man-made extremely disharmonious, and it does not reflect the local cultural characteristics. At the same time, the large amount of waste and solid waste in the industrial area also damage the rural landscape.

### III. CONCLUSION

To sum up, as the ecological regulatory area around the city, the green space of the fringe area of Wuhan city and the ecological carrier of other urban functions bear certain functions, and its healthy and orderly development is of great significance to the sustainable development of the city. Seeing from the perspective of landscape ecology, it can be concluded that the self-circulating system of holistic ecological effect has been destroyed and the development of human and nature is not coordinated; seeing from the macroscopic perspective, it is about the problem that green space encounters the problem of “external expansion and internal contraction”, natural patches are reduced, elements are chaotic and fragmented; seeing from the micro level, the quality of green space environment is poor, the function is imperfect and the regional cultural characteristics are absent. Aiming at the practical problems of green space in the fringe area of Wuhan and the development goal of green, livability, inclusiveness, efficiency and vitality in Wuhan, this paper takes the problem as the guide and provides the basis for the development strategy of green space in the fringe area of Wuhan.

## REFERENCES

- [1] Robert L. Ryan, Juliet T. Hansel Walker. Protecting and managing private farmland and public greenways in the urban fringe [J]. *Landscape and urban planning*(68), 2004,183-198.
- [2] Sarah Adine Bekessy, Matt White, Ascelin Gordon, Atte Moilanen, Michael Andrew Mccarthy, Brendan Anthony Wintle. Transparent planning for biodiversity and development in the urban fringe [J]. *Landscape and urban planning*(108), 2012,140-149.
- [3] Patrick S. McGovern. San Francisco Bay Area Edge Cities: New Roles for Planners and the General Plan [J]. *Journal of Planning Education and Research* 1998(17):246.
- [4] Nick Gallent, Johan Andersson, Marco Bianconi. 2006. *Planning on the edge:the context for planning at the rural-urban fringe* [M]. Routledge/Taylor & Francis Group.
- [5] Phelps N A. 2009.*Edge Cities* [M]. Amsterdam: International Encyclopedia of Human Geography.
- [6] Christian Bittner, Michael Sofer. Land use changes in the rural — urban fringe:An Israeli case study [J]. *Land Use Policy* (33), 2013,11-19.
- [7] Jenna H. Tilt, Lee Cerveny. Master-planned in exurbia: Examining the drivers and impacts of master-planned communities at the urban fringe [J]. *Landscape and urban planning*: 2013(114):102-112.