

**STUDY OF URBAN ECOLOGICAL ENVIRONMENT IN THE PROCESS
OF URBANIZATION**

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Abstract: There is an interactive relationship between urbanization development and urban ecological environment construction. The relationship between the two should be viewed dialectically, and a scientific management system should be built to promote both sides' coordinated and symbiotic development. Under the current situation, urban ecological environment construction in China is facing the contradiction between urban ecological environment protection and urban economic growth, the deterioration of resources and environment aggravated by urbanization, and the incompatible relationship between market-led and government governance. Based on the model of ecological environment governance in devel-

oped countries around the world, we propose measures for the construction and management of the urban ecological environment in China's urbanization process.

Keywords: urbanization; ecology

Introduction. The impacts of human activities on Earth systems since the Anthropocene are multiple and complex, with urbanization being one of the most important human activities (Hermanns & Li, 2018; Lewis & Maslin, 2015). The continued expansion of global urbanization is observed around the world (Gerten et al., 2019). As urbanization continues to accelerate, the ecological and environmental problems faced by cities are becoming increasingly prominent. To address ecological issues, promote harmony between humans and nature, and facilitate sustainable urban development has become a concern for many people. Professor Ma Shijun, a famous Chinese sociologist and ecologist, proposed the "social-economic-natural" ecological theory as early as 1981 (Ma, Shijun & Wang, Rusong, 1984). This theory (Ouyang, Zhiyun, 2017; R. Wang et al., 2011; Wang, Rusong & Ouyang, Zhiyun, 2012) considers that the current society, economy, and nature on which people live is a large complex interwoven system, in which society is the superstructure of economic development, the economy is the foundation of social development, and the economy is the basis of social development. In this system, society is the superstructure of economic development, the economy is the basis of social development, and the economy is also the intermediary linking nature and society. Nature is the basis of the overall economy, society, and the composite ecosystem. This composite intertwined and integrated ecological view has pushed the study of urban ecology to a new height and has clarified the ideas for solving urban ecological problems. In recent years, against the backdrop of China's accelerating urbanization, the Chinese government has also paid more attention to the issue of urban ecological and environmental governance. In the report at the 19th National Congress of the Communist Party of China (Communist Party of China, 2017), it was emphasized that China should build a system of harmonious coexistence between human beings and nature and create more high-quality ecological products to meet the growing material needs and ecological environment needs of the people. China has reorganized the relationship between society, economy, and nature and analyzed the urban ecological and environmental governance issues from a new height of national and even global ecological development. We believe that with the rapid development of the times, the resonance of scientific and technological innovation and talent drive at the same frequency, and the gradual application of various innovations, urban ecological and environmental governance problems will be able to be solved (Hu et al., 2020; Xie et al., 2020).

I. Current status of urbanization in China

Since the founding of New China, China's urbanization development level has been rising, especially since the reform and opening up; with the continuous acceleration of China's industrialization process, China's urbanization development has ushered in new opportunities. According to statistics from the National Bureau of Statistics of China, it was found that at the end of 2020, the urbanization rate of China's resident population reached 63.89%, an increase of 14.21 percentage points compared to 2010. The resident urban population reached 901.99 million, an increase of 236.41 million compared to 2010 (National Bureau of Statistics of China, n.d.). From 2000 to 2020, China's urbanization rate is rapidly developing, and the level of urbanization continues to increase. During this period, the massive concentration of labor, capital, and other factors in China's cities and towns generated economies of scale, driving the country's production efficiency and economic growth. According to information published by the IMF (International Monetary Fund Statistics, n.d., pp. 1980-2024), China's GDP in 2000 was US\$1211,347 million, ranking sixth in the world and accounting for 3.6% of world GDP, and in 2020 China GDP is 14722731 million USD, ranking the second in the world and accounting for 17.38% of world GDP. For twenty years, China's economy has maintained medium to high growth.



Figure 1. – Trends in China's urbanization rate, 2000-2020

With the increasing urbanization rate, China's urbanized population is growing, which has been an important driving force for cities' social, economic, technological, transportation, cultural, and productive development and has contributed to their rapid growth. However, economic development has certain drawbacks, especially when urban policymakers prioritize economic development; a series of "urban diseases" have gradually emerged, among which ecological and environmental problems are the most obvious (Yasmeen et al., 2019). With the high concentration and continuous growth of the urban population, the consumption needs of urban people are increasing, the exploitation and consumption of natural resources are increasing, the ecological footprint is growing, and the "metabolic" function of the city itself can no longer meet the real needs, which brings a big impact on the ecological balance of nature (Ahmed This has had a major impact on the ecological balance of nature (Ahmed et al., 2020) and has hurt human production and habitat (Yigitcanlar & Teriman, 2015), leading to waste enclosures (Kuang & Lin, 2021), traffic congestion (Rana, 2011), ecosystem degradation and water problems (Grumbine, 2014), air quality (Han et al., 2014), environmental pollution (Y. Sun et al., 2021), public health and population health (Cox et al., 2018; Jiang et al., 2021; Van de Poel et al., 2012), and a host of other issues. In order to solve these problems, the Chinese government has proposed a new type of urbanization development path, emphasizing the need to develop urbanization in an orderly and healthy manner, pay attention to the ecological environment of cities while promoting their economic development, place the ecological environment in the top position of urban development, and follow the ecological civilization, four synchronizations (promoting the simultaneous development of industrialization, informatization, urbanization, and agricultural modernization), people-oriented, cultural heritage, and optimized layout new path (The Central Committee of the Communist Party of China, the State Council of China, 2014). This initiative brings a very favorable effect on the solution of China's urban ecological environment problems. However, it takes a long time to achieve this goal and requires organic cooperation among various departments and personnel. China is still in the stage of exploring and figuring out the construction of this area. There is still a need to further improve the speed and efficiency, and ecological effect of the new urbanization construction in the future (Yu, 2021).

II. Analysis of the interaction between urbanization development and urban ecology

Global urbanization has a profound impact on the ecological environment. There is an extremely complex non-linear coupling and forcing a relationship between urbanization and the ecological environment as they intersect and influence each other (Fang et al., 2016). On the one hand, the effective maintenance and development of the urban ecological environment can promote cities' overall sustainable development capacity and continuous innovation vitality (Y. Sun et al., 2021). On the other hand, the rapid development of urbanization will bring opportunities for urban ecosystem maintenance, enhance the government's attention to urban ecosystem construction, and promote effective solutions to urban ecosystem problems (Fang, 2015). Conversely, although habitat and biodiversity conservation has begun to receive more attention, rapid urbanization can also lead to greater pressure on urban ecosystem maintenance, with urban sprawl exacerbating the degree of ecosystem degradation and the resulting direct and indirect impacts continuing to increase (McDonald et al., 2020). Therefore, to promote the effective maintenance of the urban ecological environment, it is necessary to analyze the reality of urbanization development in detail, fine-tune and study the relationship between the two, and formulate guiding measures for their mutual promotion and development at a higher level. Specifically, the interrelationship between the two is shown in figure 2 below.

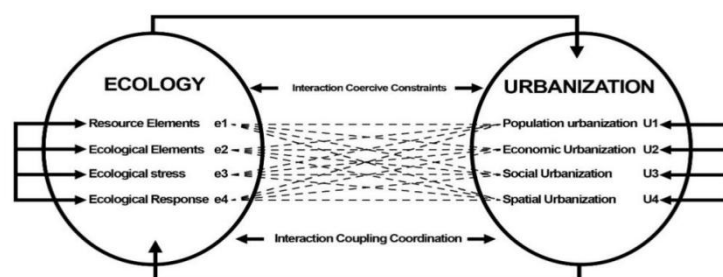


Figure 2. – Map of the interaction between urbanization development and urban ecology

(i) Effective maintenance of urban ecosystems can promote healthy and sustainable urban development

The healthy development of cities is based on the ecological environment (Shittu et al., 2021). According to the "social-economic-natural" complex ecosystem theory mentioned above, nature is the basis for overall economic and social development. Only by maintaining the natural environment and promoting ecological balance can we lay the foundation for the city's good economic and social development. If the city does not pay attention to the maintenance of the ecological environment but only focus on economic development, it will inevitably lead to the destruction of the ecological environment; not only people's production and life will be affected, health will also be affected, the city's economic development lacks sufficient power to support, the final result is inevitable "both lose and hurt" (Ouyang et al., 2016). Therefore, to promote the effective development of urbanization and enhance the overall development of cities, it is necessary to pay attention to the maintenance of the urban ecological environment.

(ii) Rapid urbanization can provide opportunities for urban ecosystem conservation

Urbanization has become an important trend in China's development. This phenomenon has existed since the founding of New China and has become more pronounced with the deepening development of reform and opening up. The development of urbanization represents the country's progress and reflects people's increasing pursuit of quality of life. With the rapid development of urbanization, China's urban population is increasing, people's demands for urban development are rising, and the government will raise its attention to urban development and strengthen the construction of all aspects of urban operation in conjunction with people's growing needs, which brings opportunities for urban ecological maintenance (Koop & van Leeuwen, 2017). In this context, various urban economic, social, and ecological problems will be solved one by one. The government will develop more scientific management measures to further promote the harmony of the urban ecological environment and drive sustainable development. For example, in 2018, the Central Committee of the Communist Party of China and the State Council of China issued the Opinions on Comprehensively Strengthening Ecological Environmental Protection Resolutely Fighting the Battle of Pollution Prevention and Control (Central Committee of the Communist Party of China, & State Council of China, 2018), and issued the Opinions on Carrying Out Ecological Environmental Protection Laws, Regulations, and Normative Documents Cleaning Work (General Office of the State Council of China, 2018), which comprehensively revised and improved administrative regulations related to ecological, environmental protection and further clarified the path of urban ecological, environmental governance. 2021 China's State Council issued the Action Plan for Carbon Dioxide Peaking Before 2030" (China State Council, 2021) to promote the transformation of China's energy resources, industrial structure, consumption structure, urban and rural construction, and lifestyle to green and low-carbon, and continuously improve ecological and environmental quality.

(iii) Rapid urbanization poses challenges for urban ecology

In the context of urbanization, the urban population is increasing, and urban waste is multiplying. With a large population, the rapid increase in the rate of urban economic development, while the related environmental protection has not kept up, resulting in a very serious challenge to the urban ecological environment (Koop & van Leeuwen, 2017). When the environmental carrying limit is reached, various resources can hardly meet the realistic needs, and cities will inevitably face a shortage of public green space, water resources, and energy. Environmental pollution problems are getting worse, and cities are no longer livable living spaces for human beings. If the government fails to address the above problems promptly, it will easily lead to a dilemma in the healthy development of cities (Niknamian, 2019; Y. Sun et al., 2021).

III. Pressures and challenges of urban eco-environmental construction in China's urbanization process

(i) Significant contradictions between urban ecological protection and urban economic development

In developing the urban economy, the relationship between various factors, including the economy and resources, the economy and the environment, etc., should be fully analyzed and explored. The role of various factors should be comprehensively analyzed to make the development of urbanization "holistic" and improve the quality and efficiency of urban development. From the trends and history of development in the world, it is found that there is a significant correlation between the level of economic development and per capita commodity energy consumption, and the total energy consumption will continue to rise with urbanization and the widening of the income gap. Since China's reform and opening up, although China has made significant progress in economic development, there has been a multi-fold increase in energy consumption and increasingly serious ecological pollution. This crude development model, which is based on economic development at the expense of the ecological environment, has to some extent offset the achievements of economic development and has also had an irreversible impact on

the total regional energy supply. The current contradiction between urban ecological and environmental protection and urban economic development in China is even more obvious, and how to balance the relationship between the two, promote the improvement of urban ecological and environmental protection, and further promote the sustainable development of the urban economy has become a problem that China must think about and solve.

(ii) Urbanization has exacerbated resource and environmental degradation

In the process of rapid urban development, land resources will continue to be strained, and in order to meet the real needs of the original land, use will be changed. The change of land use will also lead to the overall ecological structure of the city is affected and some degree of change. For example, after urban expansion, arable land resources become more strained, the original state of the resource environment no longer exists, and the overall resource structure changes. For example, as urbanization continues, land-use changes, causing changes in urban ecological functions, structures, processes, etc., leading to a decrease in biodiversity, which is a growing risk. The continued expansion of urban construction also brings with it the potential for greater input of environmental pollutants, which to a large extent threatens the environment and has a greater negative impact on ecosystems and individual organisms, putting the human environment, urban ecosystems, and ecological patterns at greater risk.

(iii) Incompatible relationship between market-led and government governance

In recent years, the Chinese government has increased its attention to urban ecological and environmental protection and has made significant achievements in urban ecological and environmental management from many aspects. Overall, urban ecological environment management is not an easy task; it involves many aspects and requires the cooperation and coordination of many departments. In the environmental management process in China, a top-down approach is usually applied, with the government playing traction and guiding role in the overall management process. In contrast, others follow the government's program. And many cities are facing the phenomenon of emphasis on construction but not management, not focusing on the city to carry out environmental management planning, not being able to invest more funds in environmental maintenance and management, coupled with the lack of material and human resources allocation, resulting in the construction of urban ecological environment is still facing a serious situation. In the future, further analysis and research is needed on how China can further promote the transformation of government functions in urban construction, promote the reform of regulatory approaches, give sustained play to the role of the market, and guide the public to actively participate in the construction of the urban ecological environment.

IV. Concluding remarks

The accelerating urbanization process has put forward new propositions for constructing and managing the urban ecological environment. The original way of urban ecological environment management has shown many defects. Although countries have different national circumstances and manifestations of environmental problems, they can exchange, absorb and learn from each other's environmental governance experiences. By reforming and optimizing practices related to environmental governance abroad, it is possible to bring beneficial references to urban ecological governance in the urbanization process in the country.

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