Research on Urban Green Space System Evaluation Index System

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Abstract. “Green space” is the lung of the city. The rational planning and protection of green space is crucial to the construction and development of the city. This paper mainly analyzes the problems existing in China's current urban green space system planning indicators, discusses the principles and index system for establishing the urban green space system index system, and proposes a new concept of ecological and three-dimensional greening represented by the green quantity rate. It analyzes the relationship between urban green space system and urban planning, the impact factors of resource reserve and environmental pressure in green space system planning and their effects, and controls and localizes from urban spatial structure, shape, urban land use, environmental quality and population size demand. From the perspective of detailed control, a resource-saving and environment-friendly urban green space system planning evaluation index system is constructed to provide operational decision guidance for urban planning.

Key words: Green space, evaluation index system, quantitative research, environmental quality, green rate.

1. Introduction
In recent years, with the rapid development of China's economy, the pace of urbanization is getting faster and faster, and the rate of urbanization is getting higher and higher. However, in the process of high-speed urbanization, there are also many problems, such as the increasing land available in cities. Nervous, the green space inside the city is constantly being eaten away [1]. Modern people have gradually become dissatisfied with the urbanization of pure reinforced concrete, and people's requirements for urban living environment are gradually developing towards green and ecological. From the perspective of the history of world urban development, urban green space plays a very important role in the ecological environment protection within the city and the excessive expansion of the control city. From the 1980s, some cities in China began to pay attention to the construction of green spaces in various cities to control the scale of the city and maintain the ecological environment [2]. However, from the actual construction of cities in the past three decades, there are various problems in the urban green space. In summary, there are two main aspects:

1. Problems in urban green space planning:
   The current urban green space planning does not match the speed of China's economic development [3]. The planning process is either too ideal. The ultimate blueprint is planned, resulting in big problems
in practical operation and implementation, or too short-sighted. Green space planning can't keep up with the current expansion of the city.

2. Problems in urban green space planning and management:

The concept of urban planning in the grass-roots government is lacking [4]. Due to the pressure of economic development, the grassroots government often carries out a large number of illegal construction in the green space of urban planning, resulting in the abuse of a large amount of land resources, resulting in irreparable losses and waste. At the same time, the functions of municipal government departments are crossed and multi-head management affects the smooth implementation of the plan. However, the laws and regulations on planning are not binding and the policies are not in place. There are no measures for supervision and control of the behavior of breaking through the planning.

Based on the above-mentioned current situation, this paper analyzes and sorts out the current situation, and carries out research on urban green space planning and management protection strategies [5]. Combining the related theoretical support of system science, synergy and business city concept, this paper puts forward the implementation strategy of urban green space planning and urban green space planning management, and summarizes the characteristics and principles of the strategy, and explores green space planning and management. A combination of methods and paths.

2. Problems and solutions for urban green space planning

After 40 years of reform and opening up, China's urbanization rate has reached 58.52%. This figure is accompanied by the continuous increase of China's new urbanization construction. Urbanization is the only way for modernization. It is the country's largest domestic demand potential and development dynamism. It is of great significance to the comprehensive construction of a socialist modern country [6]. China adheres to the path of sustainable development, so China's new urbanization construction must adhere to the "green" orientation. Optimize and adjust the urban and rural spatial structure, hold the red line of land and environmental resources, and “strictly control the incremental revitalization of stocks” to improve the efficiency of urban operations. In response to the new situation, the urban planning paradigm has successively explored new concepts of urban construction such as green, low carbon, compact, ecological, and sponge. It objectively requires urban planning to achieve all-round guidance of urban "environment-economy-society" and build intensive and efficient The function of urban and rural space with perfect functions and environmental friendliness changes the traditional extensive land use and energy use mode. The urban development shifts from extension to connotation and intensive, making the city a high-quality and pleasant place for fair sharing, inheriting culture and highlighting characteristics [7].

Because the green space has the dynamic, complex and transitional nature of land, environment, society and economy, it also has the open, natural and artificial, and complex functional needs in specific utilization. In the process of rapid urbanization, the government, market and social groups holding different purposes are chasing public and private interests in the green space, which poses a dilemma for the current development of green space: on the one hand, its ability to carry human activities is very limited [8]. The ecological background has been occupied and destroyed in disorder; on the other hand, urban expansion and population growth require an increase in the intensity of life production on the unit land. As a result, the “human-land” conflict has been multiplied, and the following three major problems have arisen:

![Fig.1. Problems caused by the "people-land" conflict](image)
(1) Ecological problems - the ecological pattern has been severely disturbed, weakening the ability to screen the city

A large number of urban development and regional infrastructure factors have caused the natural flexible matrix to continuously transform into the artificial hardening matrix. The original continuous green space is cut, the islanding and fragmentation phenomena are intensified, and the perforation effect is increasingly obvious. A large number of plaques are embedded in the green matrix, a large number of natural plaques are lost or lose their ecological functions, the ability to recover is lost, and the complexity of the green space structure is reduced, resulting in the homogenization of the overall regional habitat, which also weakens its biological production and isolation. The ability to avoid disasters, eliminate pollution, and ventilate diversion.

(2) Life problems - the loss of regional life characteristics, the need to improve the living environment

The traditional urban construction space and the green environmental space are often organically combined, and the urban form and personality are distinct[9]. As a background of residents' daily life and work, the green environment space accumulates the history and culture of the city, making the public lifestyle a unique regional, such as the mountain town trail and the river greenway. In the great changes in urbanization, due to the lack of scientific guidance, the green landscape features closely related to public life are gradually disappearing, and the aforementioned land, ecology, and production problems have emerged, and eventually the public's human settlements lifestyle may face “convergence”. “Danger”, we must build and manage green space, avoid “urbanization” of rural living environment, encourage green travel, green leisure, and restore the characteristics of regional living environment.

(3) Land issues - the city has been extensively expanded without a bottom line, and land use has been continuously squeezed

The relative lack of land resources has become the main limiting factor for urban expansion[10]. Various interests have driven the city to expand without “bottom line”, and large-scale expropriation of high-quality farmland and woodland wetlands with superior geographical conditions as construction land, even in spite of geological conditions “towns up the mountain” Taking up rivers and natural disaster areas, putting the city at risk, it also "caused the weakening of the intensive use of land in urban construction areas, causing inefficient and extensive use of land.” Since urban land expansion is an objective demand, it is not practical to absolutely protect green space. Therefore, finding the balance between “protection” and “utilization” is the basic problem of green space construction.

Fig.2. Basic procedures for urban green space planning
The overall goal of our urban green space planning is to achieve effective protection of green space by optimizing, guiding and controlling the structure, function and land use of urban green space systems, guided by “ecological priority, green production and livable life”[11]. Continuous use and rational development to promote the comprehensive and coordinated development of "social-economic-environment" in urban planning areas to achieve the greatest overall benefits.

3. Problems and solutions to the green space planning management strategy

The rapid development of the economy and the improvement of the quality of life have prompted people to pursue a better living environment[12]. Compared with the pre-reform and opening-up period, China's urban green space planning is paying more and more attention in the process of urbanization construction, and the urban green space is also growing. The change in Table 1 shows China's urban green space construction area from years 2010 to 2017.

However, due to the fact that China has not yet formed a complete and unified spatial planning system, it still conducts special planning based on the original production factors[13]. The planning of different departments is reasonable from the perspective of administrative management of various departments, but when implemented in a specific space, it may face problems such as spatial duplication and space
conflicts. At present, the introduction and implementation of various departmental plans are often operated by departments according to their respective functions. Due to the limitations of the departmental perspective and the influence of departmental interests, there is a lack of coordination and coordination in specific actions. It is often difficult to form synergies and the implementation effect is not good. The implementation of green space planning, the main management functions are derived from the urban planning department. Due to its comprehensive nature, its protection and control process often requires coordination of departments with ecological factors, such as land, environmental protection, water conservancy, agriculture, and gardening, and requires regulations other than planning (such as land management law and environmental protection). Law, etc.) to achieve the purpose of planning control. At present, the ecological belt planning still lacks effective collaboration with relevant departments. Each department often carries out its own policies or pushes each other, resulting in unsatisfactory implementation of green space.

Faced with the existing problems of green space planning management, it is necessary to construct an implementation strategy system that integrates with the urban green space planning management mechanism[14]. This system is a comprehensive integration system including planning concept, planning mechanism and planning system. The planning concept, planning mechanism and planning system are mutually cooperative and integrated. The relationship between planning and planning management is mutual feedback and coordination [15].

In addition, as China's current regional spatial planning system has not yet been established, the functions related to spatial planning are undertaken by different departments, and the functions between departments are crossed and overlapped. The relevant legal connections are not enough or even contradictory. As a result, the phenomenon of mutual wrangling, fighting, and multi-head management in actual work is caused [16]. While the green space is on the land, it is mostly in the urban fringe area. Therefore, it is necessary to strengthen the integration of the administrative system of green space planning in strengthening the urban planning management work in the actual management work. For example, by strengthening departmental collaboration, establishing an efficient and unified administrative management system, and allowing the public to participate in the bottom-up, etc., to improve the efficiency of administrative management.

![Diagram](image)

**Fig.5.** The overall construction of the theory of green space implementation strategy system

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