

Research on the Quality Improvement of Suburban Cultivated Land

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ABSTRACT

As a transition zone of urban-rural integration, the construction of cultivated land quality in suburban areas is of great significance to ensure food security and promote regional sustainable development. This paper comprehensively analyzes the current situation, problems and influencing factors of suburban cultivated land quality, and proposes corresponding construction strategies. The results show that the construction of cultivated land quality in urban and suburban areas needs to comprehensively consider natural conditions, socio-economic factors and policy orientation, and realize the continuous improvement of cultivated land quality and multi-functional and coordinated development through scientific planning and comprehensive management.

KEYWORDS

Cultivated land; Quality improvement; Suburban; Functional zoning; Policy

1. INTRODUCTION

Due to their historical dependence on agriculture and urban dependence, cities tend to be located in the most fertile areas of the world [1]. With rapid urban population and economic growth, global urban sprawl is expected to result in the loss of 2% of arable land by 2030, which is more than twice as productive as the global average [2]. This means that global urban expansion is encroaching on the most fertile land since the massive acceleration of countries, especially in Asia and Africa. At the same time, the global urban population is expected to grow by 2.5 billion by 2050, a 60% increase, according to the United Nations. How to alleviate the pressure of the growing urban population and maintain food security has become a common issue of concern to the world. Therefore, in order to curb the impact of urbanization on the surrounding cultivated land and ensure the agricultural production in the suburbs, most countries have introduced a series of spatial plans to ensure a stable agricultural production environment around cities and towns. Therefore, in order to curb the impact of urbanization on the surrounding cultivated land and ensure the agricultural production in the suburbs, most countries have introduced a series of spatial plans to ensure a stable agricultural production environment around cities and towns.

Suburban cultivated land is an important regional unit in the process of regional economic spatial development, and it is also an important part of China's urban spatial transformation. With the changes in the internal and external environment, its positioning and development mode are also constantly changing. The early main function is to provide citizens with special agricultural products, such as vegetables, fruits and so on. At the present stage, the resettlement pressure of many land-lost new urbanization population, such as farmers and migrant population, as well as the increasing diversified market demand of urban residents for food safety, ecological security and leisure and entertainment consumption, all promote the attention of suburban land use. It should be noted that the supply of agricultural and sideline products, the construction of cultural landscapes or environmental facilities all require agricultural activities to a certain extent, among which agricultural and forestry land has become an important carrier to carry the diversified needs of urban development. In this sense, encouraging and coordinating the multiple functions of suburban cultivated land has become an important way to maximize the overall benefits of agriculture and achieve balanced and sustainable development [3].

2. THE PRESENT SITUATION OF SUBURBAN CULTIVATED LAND QUALITY

Due to its huge development potential and low land occupation cost, land in urban fringe areas has become a hot spot for urban and rural construction. As a result, the amount of cultivated land in the suburbs has decreased sharply, the level of biodiversity has decreased, the quality of cultivated land has generally declined, and the soil pollution of cultivated land has become serious.

Studies have shown that 50-80% of China's urban construction land expansion is due to the encroachment of farmland land in the stage of rapid urbanization, and as much as 90% in some cities [4], with the encroachment of small-scale agricultural and forestry land in the suburbs being the most obvious. On the other hand, due to the promotion of intensive agricultural production, a large number of habitat units composed of small farmland and forest land have been integrated into large-scale agricultural production areas. However, the mechanized production mode of single crops affects the level of biodiversity and habitat quality, resulting in the encroachment of multiple habitats [5].

Soil contamination is particularly problematic in peri-urban areas, where industrial, transport and agricultural activities converge. Exhaust gas, waste water and waste residue emissions in industrial production, exhaust emissions in transportation, and excessive use of fertilizers, pesticides and agricultural mulch films in agricultural production all lead to the erosion of soil by toxic and harmful substances. These pollutants accumulate in the soil, resulting in the deterioration of soil physical and chemical properties, the reduction of biodiversity, and the impairment of the ecological function of cultivated land. The pollution status of cultivated land is the main object of concern for the management and protection of cultivated land in the suburbs, and the research on the causal mechanism also focuses on the environmental quality of soil [6]. Although some studies have paid attention to the fertility degradation, land fragmentation and reduction of ecological service functions of cultivated land in the suburbs, these studies only emphasize the degradation of a certain dimension of cultivated land quality, and lack of multi-source analysis of spatial differentiation mechanism. On the one hand, the quality evaluation of suburban cultivated land is one-sided, and it is impossible to guide the systematic maintenance of suburban cultivated land from multiple dimensions. On the other hand, there is a lack of research on the cause mechanism, which makes it difficult to support the zoning layout of cultivated land use with the goal of avoiding degradation risks, and it is impossible to curb the degradation trend of cultivated land in the suburbs from the source.

Improper farming practices, the abuse of chemical fertilizers and pesticides and other agricultural activities have led to varying degrees of decline in the quality of cultivated land. On the other hand, the intensive use of homogeneous cultivated land dominated by grain production functions has further aggravated the degradation of cultivated land in the suburbs [7]. The problem of decreasing cultivated

land quality has plagued the development of modern agriculture. The relationship between land use and land cultivation is not a conflict and antagonism, and conservation in land use and utilization in land cultivation can also protect and improve the quality of cultivated land. Therefore, the construction of cultivated land quality needs to break the inherent mindset of "destruction first and then treatment", especially in areas such as suburbs, which are facing complex problems and threats of cultivated land degradation, and it is the best choice to deal with the relationship between cultivated land use and protection from a balanced and coordinated perspective. The use of cultivated land in the suburbs is affected by high-intensity, specialization, and intensive agricultural production methods [8], and the quality of cultivated land is degraded. When the vulnerability of regional agroecosystems is transmitted to peri-urban areas, the degradation of suburban farmland quality is often compounded by the additional threat of urbanization. Therefore, it is necessary to understand the degradation and dilemma of cultivated land quality, and provide guidance for the construction of cultivated land quality in the suburbs from the background and root causes.

3. INFLUENCING FACTORS OF CULTIVATED LAND QUALITY IN SUBURBAN AREAS

The degradation of suburban cultivated land quality is multifaceted, and it is necessary to systematically study and judge the potential degradation threat from multiple perspectives, so as to provide more comprehensive basic information for the rational planning and utilization of suburban cultivated land. The influencing factors of the quality construction of suburban cultivated land are mainly divided into four aspects: agriculture, nature, urbanization and policy. The influencing factors of cultivated land quality are intertwined, and often have different or even diametrically opposite effects on the quality of different dimensions. For example, the application of chemical fertilizers improves soil fertility but brings the risk of non-point source pollution [9-11], monoculture can improve the output efficiency of cultivated land but also cause the degradation of ecological quality [12], and the spatial spillover of urban capital and technology increases the input of urban farmers to cultivated land, but may also lead to marginal utilization due to the rise of opportunity cost [8].

In addition, existing agriculture-related policies and regulatory documents mainly focus on a single function, such as the growth of arable land yields, agricultural biodiversity, and environmental protection. This also leads to an imbalance in the development of multiple functions in various regions, and the dominant function affects the play of other functions, which undermines the coordinated development of multiple goals such as economy, environment and society. This complex mechanism of influencing the quality of suburban cultivated land requires spatial information with clear location to support the accurate implementation of planning decisions, and promote the sustainable development of suburban agriculture through scientific land use trade-off strategies.

4. THE STRATEGY OF THE QUALITY IMPROVEMENT OF SUBURBAN CULTIVATED LAND

The construction of cultivated land quality in the suburbs needs to comprehensively consider the relationship between the natural quality characteristics and the surrounding site conditions, and integrate the requirements of the delineation of the permanent basic farmland red line, the ecological red line and the urban development boundary [13]. Construct a cultivated land suitability evaluation system, divide the suitability level of cultivated land comprehensive utilization, and establish cultivated land use and protection zoning around the main urban area.

In addition, it is necessary to pay attention to the quantity and quality of cultivated land, strengthen the ability to regulate fertilizer and water functions, and optimize the regional distribution of cultivated land. Carry out dynamic monitoring of soil, effectively monitor the dynamics of soil fertilizer changes, ensure soil organic matter content and soil vitality, and prevent non-point source

pollution and soil pollution. It is necessary to strengthen the functional construction of high-quality cultivated land while building high-standard farmland. Coordinate the efficient use of land, the comprehensive improvement of land in the whole area, and the safety measures of the ecosystem, and adapt measures to local conditions and suitable places for planting. Improve the system of investigation and evaluation of cultivated land quality, and establish unified methods, standards, and indicators for evaluating cultivated land quality.

5. SUGGESTION AND PROSPECT

Improving the quality of cultivated land in the suburbs is an important measure to ensure food security and promote the integrated development of urban and rural areas, which requires the joint efforts of the government, scientific research institutions and agricultural producers to ensure food security and sustainable agricultural development and promote the integrated development of urban and rural areas. The suggestions are as follows:

- (1) The distribution and inter-organization of cultivated land in the suburbs directly affect the effectiveness of the ecosystem on the supply of urban services, so it should be considered in the regional ecological context and integrated into the regional landscape ecological network.
- (2) It is an important way to strengthen policy guidance and support, encourage the multi-functional development of agricultural land, and maximize the overall benefits;
- (3) Increase financial investment in agricultural science and technology research and development and improve the quality of cultivated land, and encourage scientific research institutions and farmers to cooperate to jointly explore suitable local farming models;
- (4) Strengthen the monitoring and evaluation of cultivated land quality, and use remote sensing technology to monitor and evaluate the dynamic changes of cultivated land quality.

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