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Ecological Land Consolidation Mode and Land Engineering Ecological Reconstruction in the Process of Urbanization

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Abstract

Land remediation is a process of breaking the original ecosystem and rebuilding the ecological environment, which will inevitably have an impact on the ecological environment. In the process of land restoration, corresponding biological measures must be taken to rectify the surrounding soil, vegetation, biology and water environment. Its function is to minimize the negative effects caused by these factors and ensure the best ecological environment. Therefore, it is necessary to carry out the ecological transformation design of land project on the basis of land consolidation mode, so as to realize the sustainable utilization of land resources. In this paper, taking land remediation and ecological reconstruction as the research direction, the models of land remediation and ecological reconstruction are established, and the spatial change characteristics of land use landscape pattern and the ecological effect changes caused by land use changes in the study area are discussed according to the principles and methods of landscape ecology.

Keywords

Urbanization, land consolidation, ecological reconstruction.

1. Introduction

Since the 20th century, due to the rapid growth of population, but less and less land resources can be used by human beings, the problem of land use has begun to attract the attention of countries all over the world[1]. In addition, the trend of population concentration to cities and the increasing expansion of urban land area have caused the contradiction between urban land and land used by other departments of the national economy, and the contradiction between human and land is becoming more and more prominent[2].Land is one of the important resources. With the advancement of urbanization and the advent of industrialization, the demand for construction land continues to rise, and the area of arable land has decreased sharply[3]. In stark contrast to the "population urbanization" that has produced a lot of water and thus the poor quality of urbanization development, the speed of "land urbanization" is too fast, and the space for urban development is seriously out of control[4]. Human survival requires not only agricultural products, industrial products and other material and cultural products, but also ecological products such as fresh air, clean water, comfortable environment and pleasant climate[5].

The growth process of urbanization is a process of rapid urban development, and it is also a process of drastic changes in land use[6]. The rapid growth of urbanization has brought significant land problems: the growth rate of urban land area is faster than that of urban population, and there is a trend of accelerating growth[7].Therefore, the impact of land remediation activities on the ecological environment is analyzed, and the nature and degree of the impact of various ecological environment impact factors on the regional ecological environment are predicted.Finally, the ecological reconstruction design of land engineering is

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proposed to rebuild a new ecological environment system[8]. This paper starts with the ecological land regulation mode and the main means of ecological reconstruction design, and carries out the ecological reconstruction of land engineering based on the land regulation mode, so as to achieve the purpose of green and environmental protection.

2. Analysis of Influence of Land Remediation Project on Ecological Environment

2.1. Impact of land regulation on hydrological environment

Urbanization has a great impact on the atmospheric environment, land resources, water resources and biological environment in the natural environment, and the natural ecological environment of the city has suffered serious damage, so the structure has changed[9]. Land consolidation is a new construction of the ecosystem, and the water environment in the ecosystem must be deeply affected by land consolidation. Hydrological factor is one of the most important factors of ecological environment, among which land, hydrology and vegetation determine the overall quality of ecological environment, and they form a stable triangular framework. During construction in plain areas, the original topography should be changed first, or the use area of land resources needs to be increased. This situation will increase the use of water resources, and will also change the surface runoff and surface water infiltration. If the above situation is not properly handled, the water environment will be seriously affected.

However, the area of cultivated land in the region increases during land consolidation. In order to improve the irrigation guarantee rate in the consolidation area, the water intake in some consolidation areas increases. Under the condition of certain water resources, the distribution of regional water resources will be affected. Therefore, in the implementation of land consolidation, water resources are The rational distribution of water plays a key role. Water-saving irrigation measures can be adopted to improve the irrigation water utilization coefficient, which can not only meet the water consumption in the finishing area, but also will not affect the water demand in the surrounding or downstream areas.

2.2. Impact of Land Remediation on Climate and Environment

Land consolidation will also have a certain impact on the local climate, mainly through the following two aspects. The first is to change the rainfall, temperature, humidity and wind speed in this area, mainly due to the large-scale reduction of vegetation coverage and the increase of surface exposure caused by land remediation; The most obvious example in this regard is that in the context of urbanization, large-scale land requisition has brought about the urban heat island effect. The second is the increase of CO2 content in the air, causing air pollution.Although the construction process will not affect the soil structure or soil geology, in the land remediation work, if the work is not carried out according to the principle of adapting to local conditions, as long as there are unreasonable phenomena, the stability of the soil surface or soil productivity will be damaged. , and then seriously affect the ecological environment around the land.

The classic model of urbanization development stage-"S"-shaped curve's impact on the environment can be expressed differently from three different stages of urban development, as shown in Figure 1:

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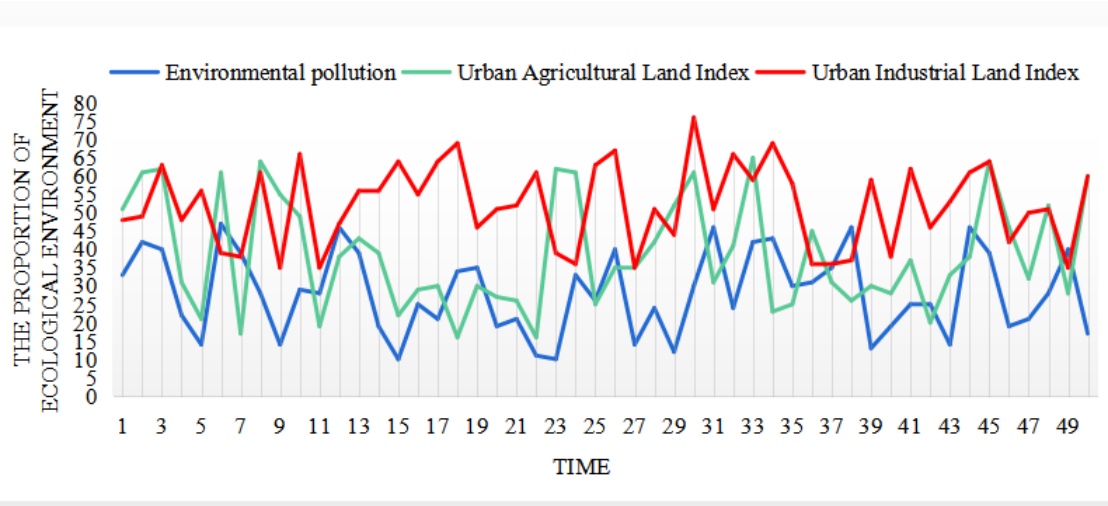

Figure 1 The environmental impact of different stages of urbanization

2.3. Impact of land remediation on Biology

The land remediation plan avoids nature reserves, forest parks, water sources and wetland reserves, and does not have a negative impact on biodiversity[10]. The main objects of agricultural land resource development in land consolidation are the development of reserve land resources such as barren hills, wasteland, tidal flats, and fragmented plots suitable for farming, and the potential transformation and development of low-yield fields. For the area around the land project, if not afforested, the ecological environment will be affected to some extent. In the large-scale ecosystem, that is, landscape, regional and even global level, a wide range of comprehensive management is needed, including land use adjustment and reasonable ecological pattern maintenance, such as soil and water conservation, desertification (rocky desertification) prevention and control, biological carbon sink and storage, etc.

Different lands play different roles in the environment. Agricultural land and natural soil, because of the almost natural soil structure and the rich role of microorganisms, plants (crops), animals in the soil, will decompose and purify pollutants in the soil and water environment, and even absorb and purify air pollutants. This is the environmental self purification function of natural land. Some natural ecosystems have been seriously damaged or destroyed, and their restoration urgently requires strong intervention, scientific design, and scientific implementation of land remediation.

3. Sustainable development of ecological environment in urbanization

3.1. Reconstruction of soil mass and geomorphology

The ecological reconstruction of land engineering should first create a soil environment and landform suitable for the growth of vegetation, because the destroyed land resources, water resources and biological resources are closely related. Moreover, we should formulate a reasonable land remediation management plan, optimize land remediation projects, clarify the responsibility of ecological construction in the remediation process, and actively improve the quality and efficiency of remediation projects. On the land where the original natural ecosystem has been completely destroyed and disappeared, it is necessary to take decisive reconstruction or new construction measures, such as returning farmland to forest, returning grazing land to grass, returning farmland to wet, afforestation and planting grass, so as to imitate and rebuild the original ecological system. systems (if traceable) or new artificial ecosystems adapted to local natural conditions. The main reason is that the expansion of the city and the rapid development of urbanization make all kinds of land use change to construction land, which leads to the degradation of the quality of species habitat and the decrease of biodiversity. As a

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result, the ecosystem is destroyed, and a series of ecological and environmental problems are caused, which ultimately reduces the ecological security of the landscape. As shown in Figure 2:

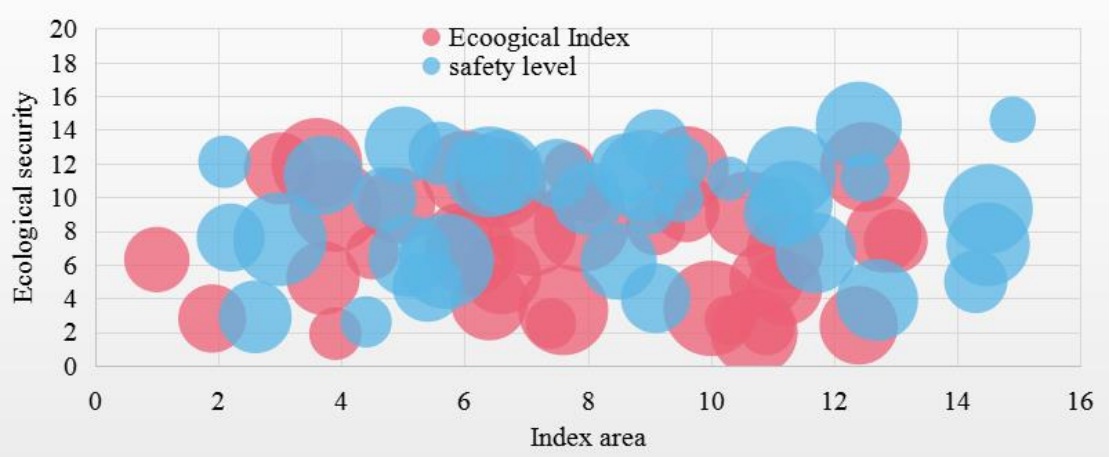

Figure 2 Area comparison of landscape ecological security index

First, construct environmental landforms suitable for the growth of vegetation to provide a good environment for the growth of vegetation; Secondly, on the basis of ensuring compliance with the principle of adjusting measures to local conditions, different integrated projects are used to reshape the soil, and when reshaping the soil, we must pay attention to the sustainable stability of landform and soil erosion. Therefore, in the process of remodeling and reconstruction, we must adjust measures to local conditions, take corresponding technologies for different types of land to carry out ecological reconstruction, and pay attention to the continuous stability of landform and the maturing and fertilizing of new land and the control of water and soil loss.

3.2. Biodiversity returns and ecological functions continue

Nowadays, the development of the times has driven the rapid urbanization, and the ecological environment and natural resources are also facing a major test. In order to protect the living environment of human beings from any infringement under the development of cities, we must formulate some reasonable measures to protect them. Crop ecosystem is a system with high productivity in terrestrial ecosystem, and its biomass (dry weight) is very high. The carbon content in biomass reaches that of crop soil, and a large amount of organic carbon is also stored. According to the climate and soil conditions in the region, local plants should be rebuilt as much as possible, and plants with strong stress resistance, high germination rate, strong regeneration ability and developed roots among local plants should be selected, which can attract wild animals; Give priority to plants that can improve the soil as much as possible, such as nitrogen fixing plants; At the same time, we should also pay attention to the reconstruction of ecological functions and ecological processes, and reduce the economic expenditure of vegetation restoration. When the vegetation is gradually restored, the theory and technology of landscape ecology and plant ecology are used, focusing on the diversity of species composition, age structure and resource utilization, and constructing a spatially reasonable and ecologically safe pattern of vegetation, and gradually forming a complete ecological Process material and energy cycle, have good ecosystem service function and continuous benefit output, reproduce local biodiversity, and promote the sustainable development of degraded and unused land.

3.3. Index system of urbanization level and comprehensive measurement model of urbanization level

In the early stage of land use change research, this research mainly focuses on the manual investigation, classification and mapping of land use types. The rapid development of science

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and technology has provided strong theoretical and technical support for the ecological construction under land remediation. At the same time, the ecological reconstruction of land remediation in China is still in the preliminary stage, and there is still a lot of room in both theory and technology. The land use/cover changes are analyzed by the land use model, and the driving force of land change is analyzed by the grey relational method. Land use change reflects not only a time series of changes, but also a change process of spatial distribution. Because of the high spatial heterogeneity of land resource utilization, land use structure and land use degree, each land use change has to be implemented in a certain spatial range, which has obvious scale correlation.

Analytic hierarchy process is used to determine the weight of each urbanization index and the weight of the next sub index of urbanization index; On this basis, the weight of each sub index is determined by hierarchical weighting. The urbanization index system of the city and the weight values of each index are shown in Table 1:

Table 1 Urbanization Index System

	Urbanization indicators	Index value	Indicators and weights	Weight value
Urbanization level	Population urbanization indicators	0.61	Urban population	0.65
			Urban population density	0.43
	Economic Urbanization indicators	0.35	Per capita GDP	0.56
			Gross industrial product	0.33
	Living urbanization index	0.21	Green space coverage	0.31
	Social urbanization indicators	0.16	Road area	0.62

In order to scientifically conduct comparative research on various urbanization indicators, the original indicator data must be processed to eliminate dimensions to eliminate the influence of different units and dimensions on the analysis results.

4. Conclusion

Land renovation refers to making full use of existing land resources to maximize and plan the utilization rate of land, and constantly strive towards this fundamental work goal. Specifically, the original ecosystem should be completely broken, and the existing ecological environment should be redesigned or reconstructed. Through the comparative analysis of the three groups of indicators of urbanization level, land use degree and urban ecological environment, it can be seen that the urbanization level slightly lags behind the development of land use degree and urban ecological environment. The impact of land use change and urban ecological environment is limited.

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Ecological landscape land remediation mode attaches importance to landscape reconstruction and rural pollution control, but at present, land remediation is in the transitional stage from quantity to quality, and the landscape ecology and pollution prevention in land remediation have not been paid enough attention. Through the ecological land regulation mode and ecological reconstruction design, this paper establishes the analysis of the land regulation model in the process of urbanization. The landscape regulation mode improves the landscape connectivity of lakes, rivers and ponds through the connection of river networks, the construction of dikes and the greening of dikes, forming a typical landscape feature of Jiangnan waterside villages where "rivers, lakes, fish, dikes, willows and people" complement each other; "Arbor, shrub and grass" buffer zone shall be set for the treatment of point source pollution to improve the isolation and protection function; The basic farmland regulation mode emphasizes the withdrawal and merger of fields and the construction of farmland water conservancy facilities to improve the production function of farmland landscape; The village renovation mode builds basic public services and leisure and sightseeing facilities, and improves the living and leisure functions of the village landscape. From the perspective of landscape ecological security, due to the impact of rapid urbanization, the overall landscape performance of the patch density, landscape shape index, diversity index, evenness and fragmentation showed an increasing trend, while the maximum patch area and average patch area decreased. Small, various types of landscape patterns are fragmented and irregular, and the overall performance is that the landscape patterns tend to be fragmented and discrete.

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