

Progress in Research on Land-use Transformation

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Abstract

Land use transition refers to the trend of land development and use patterns at a specific time and in a specific area, and it was firstly proposed by foreign countries in the study of forest land change, which at first referred to the sudden change of forest land area in the mutual game between stakeholders, and gradually evolved into a new way to study land use/cover change (LUCC). At the beginning of this century, it was introduced to China by our scholar Professor Long Hualou, and was first explored in practice, and received great attention from academics and the government. The connotation of land use transformation is constantly enriched and evolved, and at the beginning of entering China, it was used to characterise the corresponding temporal changes of land use structure and form in the process of economic and social development. With the deepening of research and the improvement of China's land resource management level, land use transformation has not only portrayed the overall structural changes in land use brought about by different stages of economic and social development, but has also gradually penetrated into the study of the transformation of land subtypes, and the connotation of land use transformation has also expanded from land use structure to the two major aspects of explicit and implicit transformation of land, with a greater focus on subtle and implicit transformation of land use brought about by economic and social development. It focuses more on the subtle and hidden transformation changes of land use brought about by economic and social development. According to the current academic understanding of land use transformation, the definition of land use transformation can be summarised as the process of changing land use patterns from one state to another, driven by changes in economic and social development, which includes both explicit (quantity, area, space) and implicit (quality, property rights, function, etc.) land use changes, reflecting the changes in a particular stage of economic and social development. It reflects the game and conflict regulation process of land use patterns between different interest subjects and sectors at a specific stage of economic and social development.

Keywords

Jilin Province; A Major Grain-producing County; Transformation of Cultivated Land Use; Scenario Simulation.

1. Introduction

Studies based on land use transformation have provided rich theoretical and empirical ideas for land management, and have made important contributions to the sustainable use of land resources and the improvement of land management in China. On the whole, early studies focused more on the characterisation of land use transformation, and then gradually began to pay attention to the driving mechanism behind it, and then subdivided the land use transformation and began to pay attention to various natural and economic and social impacts brought about by the transformation, including ecological impacts, ecological resilience impacts, environmental impacts, land function impacts, land use efficiency and so on, at the same time, the land resource management studies based on the land use transformation have been gradually enriched. At the same time, research on land resource management based on land use transformation has been gradually enriched [1].

2. Characteristics of the Land-use Transition

Specifically, land use in many regions has shown obvious characteristics of transformation, with multifaceted and multidirectional impacts on the natural economic and social systems. In terms of explicit land-use transformation, the country as a whole has shown obvious differences between the north and south and structural transformation features, with no fundamental reversal of the trend of a continuous increase in urban and rural construction land and a continuous decrease in arable land, and the unbalanced transfer of arable land between the north and south becoming more and more serious. The transformation of regional land use also shows great fluctuations along with economic and social development, and structural transformation and spatial agglomeration also show different characteristics in the process of regional development [2].

Economic development and urbanisation have obvious impacts on land use transformation, and land use transformation in peri-urban and developed areas is more drastic and land use diversity is richer. The implicit transformation of land use and economic and social development have shown a certain degree of phase balance throughout the country, but regional spatial differences are very obvious, and the characteristics and driving factors of transformation in different regions show great differences. The degradation of land ecological functions is more obvious in more regions, especially in the more economically developed regions, while the production and living functions of the land tend to be better enhanced. The relationship between land use transformation and other natural economic and social systems has become more complicated. There is a strong coupling and interaction between land use transformation and rural spatial reconstruction, with rural spatial reconstruction being the driving force and real demand for land use transformation, and land use transformation and agricultural production structural adjustment having obvious mutual feedback effects. Land use transformation will cause the fluctuation of the value of ecosystem services to decrease, and will also bring about the increase of carbon emissions from land use. In the process of land use transformation, the transfer of grassland to mining and construction land causes a decrease in the quality of regional habitats, and conversely, a gradual increase in habitat quality, especially in ecologically fragile areas [3].

3. Land Use Optimisation Strategies

Research on land use optimisation strategies based on the perspective of land use transformation is also rich. Tan Lin and others believe that we should promote sustainable development based on ecological civilisation, the constraint mechanism of spatial planning, accelerating industrial upgrading, safeguarding the rights and interests of relevant parties,

innovating the land policy system, and enhancing the coupling and coordination between land use transformation and rural spatial restructuring. According to Li Can, the change of land service supply is the key reason that triggers the mismatch between explicit and implicit land use changes, and the balance between explicit and implicit land use changes reflects the problematic characteristics of land use patterns, and focusing on the geographical scale and analysis gradient, urban-rural integrated development, reshaping property rights structure, and spatial planning are the four analytical paths to regulate the transformation of land use [4].

Often, obstacles to urban-rural integration and development also cause unreasonable changes in land use transformation, and reasonable income redistribution policies, land market and property rights restructuring should be used to promote the synergistic development of land use transformation in urban-rural integration. The problem of irrational use of land resources caused by policy conflicts and irrational policy design is very prominent in the Northeast region, and policy coordination should be further strengthened to guide the sustainable development and use of regional land resources based on the concept of comprehensive territorial spatial governance. It can be seen that among the studies on land use transformation, there are more studies on the quantitative and spatial structure regulation of land use transformation, but there is a lack of regulation strategies for the hidden transformation of land use. However, the implicit transformation of land use is most closely related to land resource management, and is an important criterion for measuring the level of land management, and is also deeply affected by land management policies [5].

4. Characteristics of Arable Land Use Transition

Cultivated land is an important part of land resources, and according to the concept of land use transition, the transition of cultivated land use refers to the trend transition and change of cultivated land use pattern in a specific region in the time series with the development of economy and society. As a natural and artificial combination of arable land, the study of arable land use transition has a long history, but the perspectives of the previous studies are scattered, which can not effectively combine the use of arable land with economic and social development, thus weakening the guiding role of the relevant studies in theory and practice. In view of the special national conditions of China, where there is a large number of people and little land, the concept of transformation of arable land use has been highly valued by scholars in China since it was first proposed, and rich research results have been achieved in recent years [6].

4.1. Visible Transformation of Arable Land

Changes in the amount of arable land are directly related to food security, and China's basic national condition of having a large population and a small amount of land has prompted China to make the protection of arable land a basic national policy to be adhered to over the long term. Since the reform and opening up, rapid economic development and the acceleration of urbanisation and industrialisation have led to the irreversible transformation of a large amount of originally scarce arable land resources into non-agricultural use, and the continuous increase in population has significantly reduced the per capita area of arable land, with the arable land pressure index continuing to increase, and the replanting index and sown area of some regions fluctuating to a certain extent, all of which have posed a great challenge to China's food security, and the situation of food security is very serious. The food security situation is very serious [7]. Based on the data of China's detailed land survey, the research group of the former State Land Administration for the protection of arable land (1998) made a systematic summary of the changes in arable land in China in recent years and the situation of medium-term development, and concluded that China must ensure a certain amount of arable land in order to cope with the severe situation of arable land protection in the process of future development. These issues

soon received great attention from academics, who have been studying the relationship between changes in arable land and economic and social development [8].

4.2. Hidden Transformation of Arable Land

Early studies on arable land protection, whether by the government or academics, took the quantitative balance of arable land as the starting and ending point. With China's economic and social development, it is difficult to cope with the increasingly complex situation of arable land protection by focusing only on changes in the quantity of arable land [9]. As a result of the problems of "taking up more arable land for better and replacing it with poorer ones", the deterioration of the soil environment, and the safety of agricultural products, the fundamental way to ensure China's food security in the future is to improve the quality of the arable land and enhance the production capacity of the arable land. The natural quality, utilisation conditions, spatial pattern and ecological safety of arable land should all be taken into account in the protection of arable land, and more attention has been paid to the evaluation of agricultural production capacity, potential, suitability, soil and environmental quality and sustainable utilisation of arable land, and the government has also carried out a lot of basic work to ensure an effective grasp of the status of arable land quality. Cultivated land quality has gradually become the focus of early research on the implicit transformation of land use [10].

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