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Viewpoint

Land policy and land engineering

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ABSTRACT

Based on the relationship between land policy and land engineering, we defined the concept of 'land engineering' and its contents, and demonstrated the significance of the establishment of land engineering. On the one hand, the land policy guided the development of the land engineering. On the other hand, the land engineering is an important means to improve and execute the land policy. The contents of land engineering are summarized as follows: (1) conversion of non-agricultural land into agricultural land; (2) conversion of low standard use land into a high standard use land; (3) conversion of current land into human construction use; (4) conversion of polluted and damaged land into usable land. Our study provides scientific support for the efficient utilization of land resources.

Introduction

Land policy is a series of standards, directions and guidance for specific economic and social interests in order to achieve land use and management in a certain historical period. As land resources are non-renewable, the core content and basic objective of a land policy is to maintain the balance between the supply and demand of land resources via policy adjustment to achieve the sustainable use of land resources. The generalized land policies include the land laws, rules and regulations, while the narrowly defined land policies include all the land policies that are directly or indirectly made to adjust the relationship of humans and land. In either way, land policy is a directional and macro political behavior appearing as the attitude, norms and guidelines of the behavior makers (Lu, 2002; Chen and Han, 2005).

Land policy belongs to the category of production relationship and its relationship to land productivity is the conversion between adaptation and non-adaptation. The influence of a land policy on economic development requires people to continuously adjust the production relationship, as well as the land regime and policy, according to the corresponding productivity. At present, the social productivity has entered the rapidly developmental stage, which requires the land policy to be adjusted accordingly.

The essential contents of a land policy are as follows: (1) Land policy is substantially a performance of a production relationship and is one type of policy. Hence, policy theories are applicable to land policy, and all land policies should be consistent with the principles of policy science. (2) Regarding the characteristics of the land phenomenon, land policy emphasizes that the human-land relationship should be adjusted for specific economic and social interests, reflecting the constraints and guidance of the land policy on land possession, occupancy, use, income, distribution, operation and management. (3) Land policy should be made by the nation or political parties. Similar to the laws, the land policy serves the ruling class, which determines the class functions and the nature of the land policy. (4) Regarding the direction and objectives of a land policy, a land policy is made to achieve land management and utilization within a certain historical period. Hence, clarifying the goals and direction of a land policy can contribute to improving the accuracy of the policy definition. (5) Land policy is the sum of a series of guidelines and direction, which is aimed to adjust and guide the institutional or personal management and utilization of the land. As a land policy can be used to adjust the land ownership and benefits, it can significantly affect the relationship between the people and the state. Hence, land policy is the basis for the relationship between the land, the people and the state. The land policy should be implemented via specific techniques and methods, which can be provided by land engineering (Willamson, 2001). Land engineering aims to actively coordinate the harmonious development of the human-land relationship, using engineering means to resolve major land issues by such as converting unused land into usable land and low standard use land into high standard use land.

Data and methodology

This paper obtained some date and information form two typical land engineering, which were the Dajihan project in the Yulin

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City and the Chan-Ba Ecological District in Xi'an. This paper intends to elaborate the land engineering content and the relationship between the land engineering and land policy. Two typical cases are summarized as follows:

Dajihan project in the Yulin City, Shaanxi Province

Located in the hinterland of Maowusu Sandy Land, Yuyang District of Yulin is a sand marsh area and belongs to agriculture pasture ecotone; due to man-made destructions, it suffers from severe wind erosion, desertification and soil erosion. Yuyang district is located between 108°58′–110°24′ E and 37°49′–38°58′ N, with an altitude of 1000–1600 m. The ridge of the sand area is mainly Cretaceous red and gray feldspathic sandstone. The average temperature in the region for years is 8.1 °C, with the extreme highest temperature of 38.6 °C, and lowest temperature of −32.7 °C. The annual average frost-free period is 155 days. The regional average annual rainfall is 413.9 mm, annual evaporation is 1904 mm, average wind speed is 3.5 m/s, the maximum wind speed is 18.7 m/s and the maximum permafrost depth is 1.48 m. Aeolian sand soil is the major soil type, accounting for 93.4% of the total area. There is a large of sand and feldspathic sandstone, that cause soil erosion.

Chan-Ba Ecological District in Xi'an

The Ba River is a river in Shaanxi Province; it originates in Qinling. This river was previously named the Zishui River, but the name was changed to the Bashui River because of the achievement of King Qinmugong. In the Qin and Han dynasties, there was a bridge called the Ba Bridge across the river, which was an important transportation hub in the ancient Shaanxi area. The Chan River and the Ba River are two of the eight main rivers in Xi'an. The Chan-Ba region refers to the region surrounded by the Chan River and the Ba River.

Results

Land engineering and its contents

Land engineering can appropriately allocate land resources and organize land use in all aspects, from the macro aspect to the micro aspect and from the global aspect to the local aspect, to maintain an ideal land use structure and subsequently to obtain the greatest structural–functional benefits. Based on the current land use status, the objectives of land engineering can be classified into two categories: (1) unused land such as barren hills and wasteland, which can be comprehensively developed into usable land; (2) used land, of which the land resource value and utilization rate can be promoted by land engineering. Therefore, the core mission of land engineering is to increase the land use range and promote land productivity. In the modern society, land productivity is not only the agricultural crop output per unit area, it is also the benefits produced by all usable land, including agricultural land, industrial land, and land used for research, education, service, living and production. In China, the direct annual cost for land engineering including all of land projects is no less than 300 billion, and the market is still expanding.

In the past research, based on the land type, land can be classified into non-agricultural land and agricultural land; based on the land use degree, land can be classified into high standard use land and low standard use land; based on the land use time, land can be classified into historical land, current land and future land; and based on the land health status, land can be classified into polluted and damaged land and usable land (Wang, 2002). According to the core mission of land engineering, the research directions of land engineering include: (1) conversion of non-agricultural land into land usable for agriculture; (2) conversion of low standard use land into high standard use land; (3) conversion of current land into the human construction use land; (4) conversion of polluted and damaged land into usable land.

Engineering for the conversion of non-agricultural land into agricultural land

Non-agricultural land includes wasteland, barren slopes, abandoned homesteads, and mines. Land engineering can increase the agricultural land area through reclamation, consolidation remediation and, to provide sufficient land resources to ensure food safety (Wang et al., 1999). As the basic living and production material, food supply is a fundamental strategic issue for all countries and governments. Hence, promoting food productivity has always been the basic function of land policy (Cai, 2001). Food is not only the basic living material for humans; it is also an important strategic material for the national economic safety. Food safety is closely related to social safety, political safety and economic safety. Land is one of the factors key for food safety. Food safety is essential for sustainable economic development and continuous escalation of the economic development mode. Under the conditions of modern technology, food safety is basically a cultivated land issue, including the quantity and quality of cultivated land. To ensure food safety, it is critical to provide sufficient cultivated land, which can only be achieved by land engineering (Long and Zou, 2010).

Engineering for converting the low standard use land into high standard use land

The standard refers to the land utilization rate; the used land not only refers to agricultural land, but also includes construction land, as well as industrial and mining sites. Hence, the goal of this engineering direction is to promote land utilization efficiency and land productivity. During the long history of human society development, promoting land productivity has been the core mission of land policy. Hence, land engineering is a powerful means to address this issue. With the global industrialization, urbanization and technological development of the past two centuries, as well as the rapid economic globalization and regional economic integration in the past decades, human economic and social activity has been expanded to all over the world, and thus living space seems to be too "narrow". As a result, the appropriate utilization and development of scarce land resources has become a big question for people and a core issue for land policy and land engineering. For instance, in China, the area of medium and low productivity farmland accounts for 60% of the total farmland area (Yin and Liu, 2010). The unit productivity still can be decently increased via improving water conservancy facilities and maintaining an ideal agricultural production environment. During the process of urbanization, more and more farmers have left their villages and subsequently these villages have become empty, which bring on low construction land use efficiency (Long et al., 2012). By optimizing the layout, the land use efficiency of villages and small towns can be promoted to acquire more farmland.

Engineering for the conversion of current land into construction land

Current land is a land type derived based on the land utilization time, including all current land utilization modes. In China, currently there are two problems for construction land: (1) The construction land has been over-expanded for the purpose of economic development, which has caused a remarkable reduction in farmland area and the new construction land is mostly converted from farmland. (2) The efficiency of construction land development is not high due to the lack of scientific approaches, which can even affect the post-constructional social and ecological environments and subsequently hinder social and economic development. The construction land development issue is also an important content