Research on the Investigation and Evaluation of the Comprehensive Improvement of Territorial Space in Dongchuan District, Kunming City

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Abstract: This research aims to consolidate the effective connection between the achievements of poverty alleviation and rural revitalization and improve the land use and agricultural production conditions in Dashujiao Village, Tuobuka Town, Dongchuan District through the implementation of comprehensive territorial improvement projects. The research formulates targeted improvement measures by conducting detailed land use investigations and human resource assessments, combined with on-site surveys and the opinions of villagers. The key results show that the implementation of the project is expected to increase the area of effective cultivated land, improve the quality of cultivated land, improve infrastructure, and significantly increase grain yields and farmers' incomes. The conclusion is that this project will effectively promote local agricultural modernization and economic development and provide strong support for rural revitalization.

Keywords: Land Supplementation; Problem Research; Governance Objectives; Specific Measures

1. Introduction

The implementation of comprehensive territorial improvement projects is the most powerful means to consolidate and expand the effective connection between the achievements of poverty alleviation and rural revitalization. It is a major measure to vigorously improve rural production conditions, optimize the land use structure, improve the quality of cultivated land, strictly adhere to the red line of cultivated land protection, and ensure food security. It is also an important project to improve the ecological environment and the agricultural production conditions of rural people [1]. Relevant reports point out that to comprehensively promote rural revitalization, it is necessary to comprehensively strengthen the foundation of food security and firmly safeguard the red line of 1.8 billion mu of cultivated land [2]. To earnestly implement the target responsibility of cultivated land protection, Yunnan Province has issued relevant documents such as the "Notice of the Yunnan Provincial Department of Natural Resources and the Yunnan Provincial Forestry and Grassland Bureau on Coordinating the Connection and Coordination between Territorial Space Planning and the New Round of Forest Land Protection and Utilization Planning" (Yun Ziranzi [2021] No. 77), and the "Implementation Opinions of the Yunnan Provincial Department of Natural Resources, the Yunnan Provincial Department of Agriculture and Rural Affairs, and the Yunnan Provincial Forestry and Grassland Bureau on Strictly Controlling the Use of Cultivated Land" (Yun Ziranzi [2022] No. 1), which put forward new requirements and present a number of new characteristics for cultivated land protection and the balance between occupation and supplementation [3-5].

Kunming City has actively explored to ensure the sound development of social and economic construction. To reasonably solve the problems of the demand for social construction and development and the shortage of construction land indicators, the local government has issued relevant documents in a targeted manner. The documents require adhering to the strictest cultivated land protection system and the strictest land conservation system, implementing actions to protect and improve the quality of cultivated land, improving the quality of supplemented cultivated land, improving the construction quality, promoting the overall protection, systematic restoration, and comprehensive

treatment of mountains, waters, roads, forests, fields, lakes, grasslands, and villages, and accelerating the construction of the national ecological security barrier [6]. It is clearly defined to improve the management mode of the balance between cultivated land occupation and supplementation, establish a new mechanism of occupation and supplementation based on quantity and with production capacity as the core. According to the results of spatial planning, the demarcation of "Three Zones and Three Lines", and the rules for demarcating the reserve resources space of cultivated land and forest land in Yunnan Province, appropriate arrangements are made according to local conditions to take increasing the quantity of supplemented cultivated land to increase grain yields as the main task, determine the key areas of land improvement, and promote the trinity protection of the quantity, quality, and ecology of cultivated land [7, 8].

Dongchuan District is located on the northern edge of the Yunnan-Guizhou Plateau. It is adjacent to Huize District in the east, Xundian District in the south, Luquan District in the west, and Qiaojia District in the north, and faces Huizhong District, Sichuan Province across the Jinsha River. The district governs Tongdu Town, Tangdan Town, Tuobuka Town, Yinmin Town, Tuobuka Town, Tuobuka Town, Hongtudi Town, and Shekuai Township. The district government is located in Tongdu Town. The maximum north-south longitudinal distance is 84.6 kilometers, and the maximum east-west transverse distance is 51.2 kilometers. The terrain in the area is high mountains and deep valleys, with a steep topography. Taking the Xiaojiang River as the boundary, the eastern side is a mountain range, and the highest peak has an altitude of 4017.3 meters; the western side is the Gongwang Mountain Range, and the highest peak has an altitude of 4344.1 meters, which is the "First Peak in Central Yunnan". The confluence point within Dongchuan has an altitude of only 695 meters, which is the lowest altitude point in Kunming City. Due to the fact that Dongchuan is located in the world's deep and large fault zone, the geological erosion is strong, forming typical deeply cut high mountains. The altitude difference within the area is large, the terrain is high mountains and deep valleys, and the cultivated land resources are scarce [9, 10]. During the process of comprehensive territorial improvement (supplementing cultivated land) in Dongchuan District, it mainly targets Tuobuka Town in Dongchuan District, Kunming City, involving the territory of Dashujiao Village Committee, 50 kilometers away from the Dongchuan District government. The project area is located in the northern part of Tuobuka Town. The current situation of the project area is a plain formed by the alluvial fan of the river for many years. Most of the current situation of the project area is other grasslands and other woodlands, the terrain is flat, there are too many exposed rocks on the surface, and it is currently stable. According to the slope analysis of the contour lines of the 1:2000 measured topographic map, the terrain slope within the project area is between 2° and 15°, the terrain of the project area is high in the west and low in the east, and the altitude is between 830 and 860m, with a height difference of 30m. The four boundaries of the project area: the east of the project area is bounded by the original other woodlands, the south reaches the foot of the southern mountain, the west is adjacent to the original gully, and the north reaches the foot of the northern mountain. The project area is between 103°04′12″ and 103°04′40″ east longitude and 26°26′48″ and 26°27′9″ north latitude. The traffic in the project area is relatively inconvenient, and it is urgently needed for the local government and relevant departments to implement the comprehensive land improvement plan.

2. Preliminary Investigation

In the detailed investigation and research on land use in areas such as Tuobuka Town in Dongchuan District, Kunming City, the current situation of land use, infrastructure conditions, etc. in the whole area are investigated, with a focus on investigate the land use structure and land use degree within the areas such as Tuobuka Town in Dongchuan District, Kunming City. And the surrounding topographic and geomorphic characteristics are drawn by professional equipment, and the corresponding image data are collected. The investigators also need to investigate the human resources in the area and comprehensively evaluate the land use situation.

To carry out the relevant work of the "Comprehensive Improvement of Territorial Space in Dashujiao Village, Tuobuka Town, Dongchuan District, Kunming City (Supplementary Cultivated Land)" project as scheduled, the Natural Resources Bureau of Dongchuan District commissioned Kunming Kedi Land Technology Consulting Co., Ltd. as the technical support unit for the implementation of the project. The two parties had full exchanges and reached a consensus on relevant issues such as the guiding ideology, overall goals, implementation steps, and guarantee conditions of the project implementation. Accordingly, Kunming Kedi Land Technology Consulting Co., Ltd. started to collect and organize the relevant materials of the project, and in May 2023, dispatched a technical team to conduct on-site surveys and research in the project area together with the personnel of the natural resources departments at the city, district, and town levels, organized village and group cadres to hold a villagers' representative meeting, listened to the suggestions of the masses in the project area on the project planning, and the actual needs of the project that urgently needed to be solved. In June 2023, the technical team, together with the heads of various departments of agriculture, forestry, water, and environment, once again went deep into the project area to focus on implementing the feasibility of the planning scheme. The scheme was again solicited for the opinions of local villagers to ensure that the scheme was reasonable, applicable, and in line with the actual situation.

3. The Project of Comprehensive Improvement of Territorial Space in Dashujiao Village, Tuobuka Town (Supplementary Cultivated Land)

The problems existing in the comprehensive improvement of territorial space in Dashujiao Village, Tuobuka Town are as follows:

(1) The current situation of the project area shows that the land resources are mainly unutilized lands such as other woodlands and other grasslands (see Table 1), the land utilization rate is low, and the benefits of the land cannot be fully exerted. This situation leads to a serious waste of land resources and fails to make due contributions to the local economic and social development.

(2) Due to the long-term abandonment of the project area, the plots are rather messy, irregular, and the soil is compacted. The compaction of the soil makes it difficult for water to penetrate and retain, resulting in low irrigation efficiency and making it difficult for crops to obtain sufficient water. At the same time, due to the destruction of the soil structure, the nutrient loss is serious, the fertility decreases, affecting the growth and yield of crops. The messy layout of the plots also becomes a major obstacle to mechanized farming. The irregularity of the plots makes it difficult for mechanical equipment to operate efficiently, increasing the difficulty and cost of farming. It is necessary to carry out treatment to increase the soil's ability to preserve water, fertility, and mechanized farming ability.

(3) There are no relevant water conservancy supporting facilities in the project area, resulting in crops being vulnerable to drought in winter and spring, causing a reduction in production, and at the same time, the types of crops planted are limited, and the economic benefits of economic crops cannot be fully exerted, and the land waste is serious.

(4) Although the roads connecting the project area with surrounding villages and the roads going deep into the fields have formed a network, the road surface level is low, the road surface is pitted and uneven, and the width is inconsistent. It is easy to accumulate water when it rains and is rather muddy. Although the popularization rate of tractors and agricultural vehicles among local farmers is relatively high, due to the limitation of the road surface level, the advantages of agricultural machinery transportation in agricultural production materials and crop harvesting cannot be fully manifested. It restricts the development of agriculture in the project area and cannot meet the needs of field production and transportation after the implementation of the project.

(5) Through the investigation of the social and economic situation of the villages involved in the construction of the project area (see Table 2), most of the young and strong laborers go out to work, lacking labor; there is no basis for mechanized operation, the production cost is large, the labor input is large, and in the absence of sufficient labor, most of the cultivated land only plants the spring crops, and the other seasons are left fallow, the rotation system is basically absent, and the

multiple cropping index is low.

Table 1. Statistics Table of the Area of Different Land Use Types in the Project Area

Land Type Code		Tuobuka Town Total Dashujiao Village Committee		Total	
		Project Area	Area	Construction Scale Project Area	Construction Scale
Forest Land (03)	Other Forest Land (0307)	8.5600	8.5600	8.5600	8.5600
	Subtotal	8.5600	8.5600	8.5600	8.5600
Grass Land (04)	Other Grass Land (0404)	0.3027	0.3027	0.3027	0.3027
	Subtotal	0.3027	0.3027	0.3027	0.3027
Transportation Land (10)	Rural Road (1006)	0.0836	0.0836	0.0836	0.0836
	Subtotal	0.0836	0.0836	0.0836	0.0836
Total		8.9463	8.9463	8.9463	8.9463

Table 2. Statistics Table of the Social and Economic Situation

Name	Total Population	Labor Force	Cultivated Land Area	Per Capita Cultivated Land Area	Per Capita Annual Net Income
	(People)	(People)	(Acres)	(Acres)	(Dollars)
Dashujiao Village Committee	3593	2380	2060	0.58	8244
Total	3593	2380	2060	0.58	8244

4. Specific Measures

(1) Carry out land resource renovation work

Through the suitability evaluation and other analyses of the cultivable wasteland grasslands with a slope of less than 25° in the project area, a series of measures are taken to improve the utilization efficiency of the land and the yield of agricultural crops. Evaluate the land in the project area to understand the nature and potential of the soil; develop and level the land according to the land cultivation specifications to increase the area of effective cultivated land; improve the soil of the plots, apply more organic fertilizers, increase the soil fertility and organic matter content, improve the grade of cultivated land quality, provide good cultivation conditions for the local people, and promote the output and income of crops; during the process of land development and improvement, it is also necessary to pay attention to the protection of the ecological environment and sustainability. Reasonably use agricultural techniques and green planting models to reduce the use of chemical pesticides and fertilizers and protect the balance of soil microorganisms and ecosystems.

(2) Improve water conservancy measures

Plan and construct irrigation facilities such as water diversion pipes and reservoirs in the project area to establish a reliable water source supply mode, provide irrigation water for the project area, solve the problems of drought seasons and water shortage, and improve the field drainage conditions in the project area. Through reasonable planning and design, ensure the even distribution of irrigation water sources and the smoothness of the drainage system, effectively prevent the occurrence of waterlogging and soil salinization, and lay a solid foundation for the increase in crop production and income.

(3) Improve the road traffic system

On the basis of planning the main roads, appropriately increase the field roads and access roads to meet the field transportation needs, perfect the field road network, improve the efficiency of agricultural production and the convenience of circulation, reduce the losses and costs in the transportation process. Provide a good foundation for the modernization and mechanization of agricultural production, meet the needs of mechanized operation and intensive planting traffic after the implementation of the project, and promote the economic development and social progress of rural areas.

(4) Promote the mechanized farming mode

In view of the shortage of labor force among the masses in the project area, it is necessary to consider promoting suitable mechanical farming methods and management modes after the implementation of the project. By introducing advanced agricultural machinery and equipment such as seeders, harvesters, and fertilizer spreaders, the farming efficiency and yield can be significantly increased. Introduce

the form of cooperatives or agricultural service companies to centrally manage and use agricultural machinery and equipment. Reduce the cost of individual farmers, ensure the efficient utilization and professional operation of mechanical equipment, and further improve the production efficiency. In this way, the disadvantage of the shortage of labor force in the project area can be solved. Therefore, when configuring water conservancy, field roads and other facilities, leave room for future mechanical farming.

5. Conclusion

During the process of carrying out comprehensive territorial improvement work in areas such as Tuobuka Town in Dongchuan District, Kunming City, through the comprehensive development and improvement of the existing other woodlands and other grasslands in the area, the quality of cultivated land can be improved, the area of effective cultivated land can be increased, and the dynamic balance of the total amount of cultivated land and the balance between occupation and supplementation can be realized. Relying on various engineering measures in the land improvement project, appropriately adjusting the land use types in the project area will add an estimated net area of 8.0762 hectares of newly cultivated land for the residents in this area, improve the grade of cultivated land quality, add an estimated 60571.5 kilograms of new grain production capacity, improve the infrastructure conditions of agricultural production, ensure the food security of the local people, promote the adjustment of the local industrial structure, develop characteristic economic industries, effectively increase the income of farmers, enhance the strength of the local economy, and contribute to the construction of a new countryside.

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