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Effects of Land Consolidation on Arable Land Classification and Productivity

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Abstract

The implementation of land consolidation has a great impact on the grade of arable land and grain production capacity. The main reasons for improving the quality of cultivated land in the project area are: after the implementation of the project, the area of agricultural cultivated land in the project area has increased and the agricultural production environment has been greatly improved through measures such as soil improvement, supporting farmland infrastructure, and planting protective forest nets.

Keywords

Land Consolidation; Arable Land Grade; Grain Production Capacity; Benefit Analysis.

1. Introduction

The construction of land consolidation projects can improve the ecological environment of the land and realize the practical needs of optimizing the allocation of resources. Through the implementation of the project, the development and utilization of defective forest land directly increases the area of arable land, the scale of the field has been greatly improved, and the land use structure has become more reasonable, creating a favorable environment for the realization of mechanized farming, large-scale agricultural and industrialized management. Through the implementation of land leveling and farmland infrastructure, soil erosion has been controlled, the microclimate effect has been improved, the restoration and improvement of the ecological environment has been promoted, and land resources have been developed sustainably.

At the same time, it is beneficial to increase farmers' income and promote the construction of new socialist countryside. Jingbian County has rich and diverse agricultural resources and great potential. The development of the four leading industries of livestock, grass, potato and vegetables has formed a scale. Potatoes, millet, buckwheat noodles, beans, grain and oil and other agricultural products and grass and livestock products have broad market prospects. The project construction has developed a large area of arable land, which can rapidly expand the planting area, effectively increase the grain output, and greatly increase the income of the masses. Through land development, supporting water conservancy facilities, and improving roads and shelter forests, the conditions for agricultural production have been fundamentally improved, the stamina for agricultural development has been enhanced, the advantages of leading industries have been strengthened, and the pace of building a new socialist countryside has been accelerated.

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2. Project Overview

TJingbian County is located in the northwest of Shaanxi Province, southwest of Yulin City, 120 kilometers away from Yulin City. 03′15″. Jingbian County is located on the southern edge of the Mu Us Desert, the upper reaches of the Wuding River, and the Great Wall traverses east and

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west. The elevation of the county is between 1123m and 1823m. The terrain is higher in the south and lower in the north. The highest point of elevation is Dadun Mountain in Shuilupan Village, Jian Town, Zhongshan. It is the source of Lu River, Hongliu River, Dali River, Heihe River, Xingzi River and Zhou River. The lowest point of elevation is Baicheng in Hongdunjie Town. Jingbian County has a semi-arid continental monsoon climate with sufficient sunlight, large temperature difference, dry climate, good ventilation conditions, rain and heat in the same season, and four distinct seasons. The main natural disasters are drought and low temperature frost, followed by strong wind and hail. The average annual rainfall is 395.4mm (348.3-431.3mm), and the average sunshine hours are 2768.2h (2516.1-3037.7h). The annual average temperature is 7.8°C, the effective accumulated temperature for plant growth of ≥10°C is 2800°C (2358.0-3356.2°C), and the annual average frost-free period is 130d (115-145d). The county has sufficient sunlight, rain and heat in the same season, large temperature difference between day and night, and relatively suitable agricultural and climatic conditions. It is a traditional farming and pastoral area. Due to its flat terrain, convenient transportation, relatively abundant water resources, and rapid agricultural economic development in the northern wind beach area of Jingbian County; in the central Liangmao area, the valley bottom is flat and formed by wind accumulation and flood siltation in the past dynasties, and the nutrient content is relatively high. However, due to the poor agricultural site conditions in the southern hilly and gully area, the engineering facilities are less, the level of agricultural production technology and mechanization is low, the production efficiency is low, and the output is low. The output efficiency is low, and the agricultural income is relatively far from the Fengshatan area and the Liangmaojian area. In this area, the ditch is deep, the beam is narrow, the slope is steep and the top is bald, the terrain is broken, the hills are long and undulating; the soil is mainly loess soil, accounting for 87% of the total land area, and the texture is mainly light loam, accounting for 82% of the total land area. The nutrient content is relatively low, loose and soft, easy to erode, and serious soil erosion.

3. Main Construction Content of the Project

The main construction contents of the project area include land leveling engineering, irrigation and drainage engineering, field road engineering, farmland protection and ecological environment preservation engineering. Specifically:

(1) Land leveling works

In the project area, 56,622m3 of earthwork was leveled, 19,245m3 of foreign soil was backfilled, the total land tillage area was 68.9042hm2, and 250.67t of bio-organic fertilizer (NY884-2012) was added.

(2) Irrigation and drainage works

There are 3 newly drilled wells in the project area, 3 new water pumps, 2 200QJ32-195/15 (30KW) water pumps, 1 200QJ32-234/18 (37KW) water pump, 2378m buried main pipes (dn90UPVC), and branch pipes (dn75PE)) 3236m, capillary (dn16PE) 203647m; 7 gate valve wells, 31 water supply hydrants, 9 drainage wells, 3 management rooms, 7 well platforms (4 with backrests, 3 without backrests), 7 sets of filters, 7 fertilization tanks. Install 2 transformers (1 S13-M-50/10KV, 1 S13-M-80/10KV), and lay 580m of 380V buried cables.

(3) Field road engineering

One production road with a width of 3.0m will be refurbished in the project area. The side pavement is paved with bricks. The width of the shoulders on both sides is 0.5m and the length is 614m. Four field roads with a width of 4.0m will be refurbished, with bricks paved on the side, the shoulders on both sides are 0.5m wide and 4205m long.

(4) Farmland protection and ecological environment conservation projects

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Farmland shelterbelts are planned on both sides of the refurbishment production road and field road, with a row of plantings on each side, with a plant spacing of 2.0m. The surrounding areas adjacent to the barren grasslands and ditch edges are combined with arbor and irrigation, and two rows of Pinus sylvestris are planted. 2.0m, row spacing 2.0m, interplanting amorpha, ground diameter not less than 3cm, plant spacing 0.5m, row spacing 0.5m. The slopes of the terraced fields are protected by mixed plants of grass and trees. Amorpha pseudoacacia is interplanted with sand cypress, and alfalfa is interplanted. The row spacing of amorpha pseudoacacia is 1.0m ×1.0m, and the row spacing of amorpha pseudoacacia is 1.0m×1.0m. , which constitutes a protective green belt on slopes and ridges. The borrow pit needs to be protected by the slope and spread alfalfa. A total of 5,847 pine trees, 50,426 amorpha and 30,240 sand cypress were planted. The slope restoration area is 985.67m^2, and the alfalfa planting area is 4.0848hm^2. The length of the retaining ridge is 8212m.

4. Economic Benefit Analysis

4.1. Earnings Calculation

After the implementation of the project, the newly increased cultivated land area is 63.7808hm^2. Through soil improvement measures and the construction of farmland water conservancy facilities, the productivity of the land can be greatly improved after several years of cultivation.

After the implementation of the project, corn is mainly planted, and the yield per mu is calculated according to the average yield of the field guaranteed by local irrigation and drainage: the cost per mu before the implementation of dry land is 300 yuan, and the cost per mu after the implementation is 400 yuan; the cost per mu before the implementation of irrigated land is 400 yuan, 500 yuan per mu after implementation. Calculated according to the current purchase price of 2.0 yuan/kg. After the implementation of the project, the area of arable land reaches 68.9042hm^2 (including 26.4976hm^2 of irrigated land and 42.4046hm^2 of dry land). After deducting production costs, the annual net increase in local agricultural production is 993,800 yuan. The economic benefits after the implementation of the project are quite significant.

4.2. Cultivated Land Quality Analysis

The evaluation of cultivated land quality is a comprehensive and comprehensive investigation of various elements of cultivated land, such as climate, landform, soil, vegetation, hydrology, etc., as well as the social and economic conditions related to the use of cultivated land; to clarify the suitability, limitation, and production potential of cultivated land for a certain use. , economic benefits and both favorable and unfavorable consequences for the environment.

4.3. Cultivated Land Rating

1. Calculate the natural quality score

Based on the scoring rule table of "designated crops-grading factors-natural quality scores", the weighted average method was used to calculate the natural quality scores of the designated crops in each evaluation unit. The formula is as follows:

(Formula 1)

In the formula: ——the natural quality score of the jth designated crop in the ith evaluation unit;

Wk——the weight of the kth grading factor;

i——the evaluation unit number;

j——designated crop number;

k——The number of the grading factor;

m - the number of grading factors;

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fijk——The value of the kth grading factor of the jth designated crop of the ith evaluation unit, the value is (0-100].

2) Calculate the index of natural quality of cultivated land

The natural quality index of the jth designated crop is calculated as follows:

(Formula 2)

Among them: Rij is the natural quality index of the jth designated crop in the ith grading unit;

CLij is the natural quality score of agricultural land for the jth designated crop in the ith grading unit;

αij is the production potential index of the jth crop in the i-th grade unit, the climate production potential index in dry land, and the water, light and temperature production potential index in irrigated land;

βj is the yield ratio coefficient of the jth crop.

According to the standard farming system of Jingbian County, its ripening system is "one ripening per year", and the natural quality index of cultivated land is calculated as follows:

(Formula 3)

In the formula: Ri is the natural quality index of agricultural land of the i-th grade unit;

Rij is the natural quality index of the jth designated crop in the ith grading unit.

5. Conclusion

This report adopts the "multi-factor comprehensive evaluation method" to evaluate the cultivated land in the project area, and conducts the evaluation in strict accordance with the "Classification Regulations for Agricultural Land Quality" (GB/T 28407-2012). The factor index system and evaluation coefficient refer to "Shaanxi Province Cultivated Land Quality The parameters specified in the “Evaluation Work Manual” (2014) shall be updated annually and formulated according to the actual situation. After the implementation of the project, the evaluation results of the cultivated land quality in the project area are as follows: dryland national natural quality, etc. 12, national utilization, etc. 12, national economy, etc. 12; irrigated land, national natural quality, etc. 13, national utilization, etc. 12, national economy, etc. 12.

According to the "Grading Database of Agricultural Land in Jingbian County" (2018), the existing dry land around the project area is rated as 12 for national natural, 12 for national utilization, and 12 for national economy; the existing irrigated land The national natural grade is grade 13, the national utilization grade is grade 12, and the national economic grade is grade 12. Therefore, the evaluation results of cultivated land quality after the implementation of this project are reasonable and reliable.

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