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Suitability Evaluation of Land Reclamation——Taking the Project Area of Baoguo Old Town in Beipiao City as an Example

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Abstract

The evaluation of land reclamation suitability can predict the damaged land and it is of great significance in determining the best direction of land reclamation. Taking the abandoned land of Laojiao old town in Beipiao City as an example, this study selects the evaluation factors and establishes the evaluation index system based on the actual research situation. The evaluation results show that the drainage conditions in the project area are good, of which 36.6367hm2 is suitable for reclamation as cultivated land; 31.5327hm2 is suitable for reclamation as forest land.

Keywords

Land reclamation; suitability; evaluation.

1. Introduction

Abandoned industrial and mining lands are widespread in our country. At present, many areas have carried out the reclamation of abandoned industrial and mining lands. According to statistics, at the end of 2012, the area of land reclamation for various types of land in the country has reached 1.13 million hm2, of which 530,000 hm2 are abandoned industrial and mining land[1]. Therefore, research on the reclamation of abandoned industrial and mining areas is imminent. At present, the reclamation of abandoned industrial and mining land in my country is facing many problems, such as a series of problems such as lack of technology, national conditions and forms [2]. The research on industrial and mining abandoned land mostly focuses on the research of problems and countermeasures, the evaluation of comprehensive benefits, and the evaluation of the potential of reclamation [3-5]. It is rarely evaluated for its suitability. Therefore, this paper takes the industrial and mining wasteland project area in Beipiao City as an example to evaluate the suitability of decommissioning, in order to provide a reference for the development of land reclamation.

2. Overview and research methods of the study area

2.1. Survey of the study area

The project area is located in a low mountain and hilly area. The geomorphic units are mainly earth and rocky low mountains and hills, a small range of intermountain valleys, poor vegetation development, and complex geomorphology, consisting of gneiss, quartzite, a small

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amount of dolomite marble, It is composed of granite, rhyolite andesite. It belongs to a mid-continental climate with a large temperature difference between day and night. The annual average temperature is 8.4 degrees, the precipitation is 481mm, and the frost-free period is 145 days. It is a sandy soil and is very suitable for the cultivation of all kinds of grains. The grains produced have good taste and quality, and are completely pollution-free. Testing requirements. The soil parent material in the project area is loess or red soil layer and weathered products of various parent rocks, including cinnamon soil, leaching cinnamon soil, carbonate cinnamon soil and meadow soil, and a large area of modern river sediments are distributed . Leaching cinnamon soil and meadow soil occupy a small area. The zonal soil type in the region is mainly cinnamon soil, and the non-zonal soil type is mainly alluvial soil. It is distributed in valley plains. The soil layer is deep, high in fertility, loose soil, and granular structure. , Fertilizer effect is large, suitable for planting and so on. The pH value of the soil surface is about 6.5~7.0. The soil fertility is moderate and suitable for plant growth.

The total land area of the project area is 68.3457 hectares, the construction scale is 68.3457 hectares, the newly increased cultivated land area is 36.6367 hectares, the newly increased cultivated land rate is 53.60%, the newly increased forest land area is 31.5327 hectares, and the newly increased forest land coverage rate is 46.14%. Among them (Baoguo old town plots 001 to 007 added 7.5313 hectares of arable land and 2.1601 hectares of newly added forest land; Beitazi Township plots 008 to 025 added 8.1938 hectares of newly added arable land and 6.5888 hectares of new forest land; Dongguanying Township Blocks 026 to 034 added 3.1953 hectares of cultivated land and 3.0099 hectares of new forest land; Loujiadian plots 035 to 050 added 17.7163 hectares of cultivated land, and added 19.7739 hectares of forest land). The current status is abandoned industrial and mining land, and the land use status table is shown in Table 1.

Table 1 Current status of land use

First class	Second class	area	proportion
Towns, villages and industrial and mining land	Mining land	68.3457	100
total		68.3457	100

2.2. Research method

In this study, the selection factors were determined based on field investigations, combined with the type and extent of land destruction in mining areas, the utilization status and production level before land destruction, and the objective conditions for the rehabilitation of destroyed land resources, delineated evaluation units, and constructed evaluation models.

3. Evaluation of Suitability of Land Reclamation

The evaluation of the suitability of land reclamation is to analyze and evaluate the suitability of land reclamation based on the investigation of damaged land and the overall planning of land use, so as to design the technology and method of land reclamation, and to determine the rational use of land for reclamation. The best solution provides a theoretical basis.

3.1. Determination of evaluation objects

Based on the analysis of the status quo of destroyed land in the project area, the object of the land reclamation suitability evaluation in the project area is determined to be waste slag stone and some residential areas.

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3.2. Division of Evaluation Unit

When evaluating the suitability of land reclamation, the evaluation unit should be divided based on the type of land destruction, restrictive factors, and artificial reclamation measures. According to the actual situation of land destruction in the project area, determine the waste slag stone and some residents The point is the evaluation unit.

3.3. Determination of evaluation factors

The suitability evaluation of the land to be reclaimed in the project area should select a set of independent and complementary participating factors and leading factors. Participating factors (or factors) should meet the following requirements: one is measurability, the factors can be measured and can be represented by numerical values or serial numbers; the second is relevance, that is, the increase or decrease of selected participating indicators, which indicates the evaluation of land The improvement or reduction of unit quality; the third is stability, that is, the quality and continuity of the selected participating factors under any conditions are stable; the fourth is non-overlap, that is, the boundaries between participating factors are clear and do not overlap each other.

According to the evaluation grading standards of agriculture, forestry and grassland land for the main limiting factors in Northeast China, combined with the actual conditions of the project area, the land evaluation grades for the limiting factors of the land to be reclaimed in the project area were formulated, and the land suitability evaluation factors were determined as soil texture and effective Guest soil thickness, irrigation and drainage conditions, terrain slope. It constitutes an evaluation index system reflecting the quality of reclaimed land in the project area, and the reclamation mode is selected as forest land, cultivated land, and grassland. As shown in Table 2.

Table 2 Evaluation criteria for the main limiting factors of land to be reclaimed in the project area

Limiting factors and grading indicators		Woodland Evaluation	Cultivated land evaluation	Grassland evaluation
Slope (°)	<5	1	1	1
	5~25	1	2	1
	25~45	2	no	1
	>45	3	no	2 or 3
Soil texture	Loam	1	1	1
	Clay, sandy loam	2 or 3	3	1
	Heavy clay, sand	3	no	3
	Gravel and sandy soil	no	no	no
Effective soil thickness	0.5以上	1	1	1
	0.3~0.5	1	2	1
	0.3以下	2 or 3	3 or no	2
Irrigation conditions	Stable irrigation conditions at certain stages	1	1	
	Poor irrigation water source guarantee	2	1	
	No irrigation water source	3	3	

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Drainage conditions	No flooding or accidental flooding, good drainage	1	1	1
	Seasonal short-term flooding, better drainage	2	2	2
	Seasonal long-term flooding, poor drainage	3	3	3 or no
	Long-term flooding, poor drainage	no	no	no

3.4. Evaluation methods and results

Based on the characteristics of land reclamation in the project area, this land reclamation suitability evaluation adopts the limit condition method. According to the principle of minimum factor law, that is, the suitability of land reclamation and its grade are determined by the factor with the smallest suitability grade of a single factor (the largest restricted grade) among the selected factors. See Table 3 for the land properties corresponding to the standards for each participating unit in the project area.

Table 3 Land characteristics of land reclamation units in the project area to be reclaimed

Evaluation unit	Impact factor				
	Terrain slope (°)	Soil texture	Effective soil thickness (m)	Irrigation conditions	Drainage conditions
Industrial and mining land	<5	Loam	0.5	no	better
	5~25	Loam	0.5	no	better

The land evaluation unit in the project area and the grade standard of the limiting factors are compared and analyzed, and the feasibility evaluation results of the land reclamation of each participating unit are obtained, as shown in Table 4.

Table 4 Evaluation results of feasibility of reclamation

Serial number	Evaluation unit	area(hm_2)	Evaluation results		Remarks
			Suitable direction	feasibility	
1	Industrial and mining land	36.6367	arable land	feasible	
		31.5327	woodland	feasible	

According to the analysis results, the land reclamation in the project area is feasible, of which 36.6367hm^2 is suitable for reclamation as cultivated land, and 31.5327hm^2 is suitable for reclamation as forest land.

4. Conclusions and recommendations

In the process of reclamation and utilization of abandoned industrial and mining land, we must adhere to the objective and scientific principles to evaluate its suitability and adapt measures to local conditions to ensure its sustainable development. While paying attention to quantity, we must also pay attention to the quality of repeated cultivation. According to the principle of "easy first, difficult later, and adapting measures to local conditions", the implementation schedule of the reclamation and utilization of abandoned industrial and mining land shall be arranged to ensure the smooth completion of the reclamation project.

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