The Problems and Measures Existed In the Hollow Village Improvement

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Abstract. With the consolidation of hollowed villages, there are some problems about numerous construction wastes, tight soil construction, low nutrient content and less soil microorganisms during the rural abandoned Homestead reclamation, which impose restrictions on the conversion of rural abandoned Homestead into farmland. Therefore, it is necessary to analysis the problems currently existed in the residential land reclamation and propose the effective measure arid the suggestion of solving the problems, which could provide a basis for its reclamation into scenic region, conservation tillage or fertilizer measures. Also it could ensure the smooth progress of the rural abandoned Homestead reclamation.

1. Introduction

Soil is the most precious natural resource for human survival and development, it is the core issue of land reclamation and the key factor in determines the success or failure of reclamation and the level of benefit. In the process of rural abandoned homestead conversion into farmland, although the amount of farmland has been increased, there are some problems in the newly cultivated soil about numerous stone tiles, the physical structure is seriously damaged, soil compaction, poor ventilation, low nutrient content, it is difficult to meet the needs of growing crops, and its use is constrained by the local natural environment, transportation, and human activities. Therefore, by analyzing the predecessors' appraisal of the suitability of Hollow Village land, it is helpful to more rationally re-use the new cultivated land, so that “the forest is suitable for the forest, the agriculture is suitable for agriculture, and the landscape is suitable for the scenery” [1-3].
2. Organization of the Text

2.1. Hollow village renovation suitability evaluation

With the development of land consolidation, it is of great practical significance to rectify hollow villages and idle lands, and to evaluate the suitability of abandoned rural homestead for reclaimed land and unused land. Lin Aiwen et al [4-5] used a hierarchical fuzzy evaluation model to evaluate the suitability of some townships in Huangpi District of Wuhan City, and summarized the different levels of suitability for residential land consolidation, providing a basis for subsequent land consolidation. Gao Yan et al [6] comprehensively analyzed the development direction of residential land consolidation in rural areas of Daiyue District of Tai’an City by comparing the suitability evaluation methods of various land consolidation, and provided a reference for further land consolidation work. Li Desheng [7] In order to restore the agricultural production capacity of abandoned rural homestead and abandoned brick kiln in Chongren County, Jiangxi Province, through land reclamation, the land in the project area was evaluated and evaluated for various types of land resources to be restored to agriculture, forestry, animal husbandry and fishery. Based on the suitability and obstacles of industrial production, it is concluded that the first-class suitable agricultural land accounts for 82.91% of the project area; the second-level forest land accounts for 11.22% of the project area, and the third-grade suitable for conversion into aquaculture water surface accounting for 5.97% of the project area. Therefore, it provides a scientific basis for the rational use of land resources to be reclaimed in the project area.

Qu Yanbo et al [8] evaluated the grades of farmland quality after finishing residential land consolidation in Pinggu District of Beijing, and found that the area suitable for rearrangement was 1,922.07 hm². After land consolidation, the first-class cultivated land to the fifth-grade farmland respectively accounted for 12.75%, 21.69%, 40.54%, 15.36% and 9.66%, through the grading of farmland quality, it determines the areas suitable for agricultural planting and the areas requiring ecological protection, and make rational use of the land to be reclaimed. Qiao Liang et al [9]. Evaluated sixteen index factors such as soil type, soil texture and nutrient content, and evaluated the reclaimed land in rural homestead in Fuling District of Chongqing, and determined the level of the same farmland fertility in the area. It provides a theoretical basis on how to operate in rehabilitation and whether fertilization is needed. Lu Jiafu et al [10] based on traffic conditions, irrigation conditions, soil texture, organic matter and available basic nutrients such as nitrogen, phosphorus and potassium, carried out evaluation of land suitability of the degraded farmlands in Qinnan District of Qinzhou City, and concluded that the waste farmland in Qinnan District is appropriate farmland, suitable for reclamation. Zhang Ming et al [11] used GIS software to evaluate the suitability of land in Qukou Town, Fuyang City, Zhejiang Province, and divided the land into suitable farmland, appropriate farmland, and critically suitable farmland. It was determined that suitable farmland and appropriate farmland were suitable for reclamation convert to farmland, while critical suitable arable land is more suitable for economic forests. Liu Changsheng [12-14] evaluated the suitability of unused land in Liucheng County of Guangxi by comprehensive analysis of soil thickness, soil texture and other indicators, and obtained the land area suitable for agriculture, afforestation, and unfavorable use, respectively with 2152.71 hm², 31208.52 hm² and 35913.98 hm², and provide the basis for the smooth development of land consolidation.

2.2. Problems in hollowed villages remediation

2.2.1. Destruction of soil structure. Soil structure refers to the arrangement and combination of soil particles. Good soil structure refers to a rich granule structure and reasonable porosity, which can both retain water and nutrients, and provide sufficient oxygen for plant roots. At the same time, loose soil is conducive to the lower plant roots and utilization of water and fertilizer, which provides good basic conditions for healthy growth of plants.
However, most of the material for building houses in rural areas in China is made of masonry and other materials, the foundation has already been repeatedly practiced by human activities. In the process of hollowed villages consolidation, it is often more extensive to level the land after using bulldozers to push down the old houses and abandoned rural homestead. This leads to a large amount of masonry and other materials entering the soil, and the mechanical activities during the soil preparation process again compact the soil. Zheng Hongli [15-18] investigated the reclaimed soil of rural homestead in Chongqing and found that the surface of the reclaimed soil is generally derived from subgrade plowing soil or earth wall mutilated soil, and both of these have been subjected to human activities and have been compacted. When smashed into reclaimed soil, it is more compact than cultivated soil. Wang Yi [19] found out that a large number of demolished objects were found during the process of reclamation of rural homestead through investigated the process of reclamation the rural homestead in the sample area. These demolished items were mainly construction waste, and all but the waste wall soil were used as cover soil which in order to increase the thickness of the soil after reclamation, most of the waste is discarded or landfilled as construction waste.

Consolidated soil of hollowed villages must rehabilitate the soil after certain fertilization measures to achieve the requirements of farming soil. Ren Shunrong et al [20] made different combinations of organic fertilizers, straw, and desulfurized gypsum improvers, and set up different treatments to fertilize the soil in rural homestead reclamation facilities. It was found that adding organic manure, straw and improver can all be varied to different degrees improved soil physical structure, and the soil bulk density decreased by 16.35-25.45% compared to the basic soil, and the total soil porosity increased by 14.62-21.51%. The capillary porosity and non-capillary porosity increased by 11.89-15.66% and 25.55-38.32% respectively, and the water permeability coefficient increased by 12.0 ~ 17.4 times compared with the control, which increased the permeability and breathability of the soil. Zhang Hong et al [21] analyzed the effect of six different planting patterns on soil physicochemical properties, and concluded that various planting patterns significantly reduced soil bulk density and gravel content, and significantly increased soil porosity and soil aggregates. Zhang Lu et al [22] determined soil physical parameters after the consolidation of hollowed villages in different hill-closure years in mountainous hilly areas and found that soil clay content, pH, bulk density, electrical conductivity, etc. all have different degrees increased with the increase of reclamation years, and with the increase in reclamation years, the soil physical properties are good.

2.2.2. Fertility of Soil. Soil fertility refers to the ability of soil to provide and coordinate the water, nutrients, air and energy needed for plant growth. The soil provides the plant with all the other nutrients except carbon, hydrocarbon and oxygen, including N, P, K, Ca, Mg, S, Fe, Mn, Zn, Cu, B, Mo, Cl, Ni, and so on. Due to the action of the biological microcirculation, plants and animal residues enter the soil and form organic matter, and the organic matter contains various nutrient elements required for plant growth, which is equivalent to a plant nutrient storehouse. In addition, organic matter also affects the physical properties of the soil, that is, the formation of granule structure; at the same time, it restricts the activities of soil organisms, that is, where the organic matter content is large, the soil biological species are relatively abundant.

Since there is almost no human farming activity in abandoned rural homestead, and in the course of remediation, there is usually the phenomenon of topsoil stripping. Therefore, the hollow village reclamation soil is equivalent to raw soil, and its fertility is usually lower than conventional tillage soil. Liping Chen [23] sampled the land reclamation in hilly areas of Yizheng City, Jiangsu Province, and analyzed the nutrient indicators such as soil organic matter, total nitrogen, available phosphorus, and available potassium, and found four types of reclaimed soil (recovery of waste sandstone ore, waste clay of reclaimed land, reclaimed land reclamation, agricultural land consolidation) the soil nutrient content is lower than that of conventional farmland. Huang Yaohua et al [24] conducted a study on the soil of rural homestead in Fuling District of Chongqing City and found that more than 70% of the reclaimed land was directly pushed down, broken down, and flattened by the house wall. The organic matter in the soil was scarce, and the available phosphorus was mostly in the middle~Low level.
However, a certain fertilizing operation on the soil after the hollow village consolidation can increase the fertility of the newly added soil. Zhang Xumei [25] took Taicang City's reclamation rehearsal area as the research object and analyzed the status of soil alkalized nitrogen in the finishing area. The results showed that the soil nitrogen level in the reclamation area of Taicang City has reached the intermediate level. Ren Shunrong [26] studied the effect of different fertilization methods on the soil of the rural homestead reclamation facilities and found that increasing the amount of organic fertilizer can increase the organic matter and available nutrient contents of the rural homestead reclaimed soil, in which organic matter and available potassium were improved 65.22% and 66.53% respectively compared with the control, while the hydrolysis of nitrogen and available phosphorus were 2.31 and 3.26 times that of the control. Zhang Hong et al [27] studied the effects of different planting patterns on soil physiochemical properties by rotating different crops and found that the six planting patterns had no significant effect on soil pH, total nitrogen, and total potassium. The effects of organic matter, alkaline nitrogen, available phosphorus, and available potassium all reached significant levels, and the rotation of Hudou-maize was the best mode of planting to increase the soil nutrient content and improve the soil structure of the reclaimed rural homestead.

2.2.3. Biological properties of soil. Soil organisms include various microorganisms and protozoa. Microorganisms and protozoa both feed on organic debris and play the role of disintegrator.

The microorganisms in the soil decompose the plant and animal debris, convert the organic nutrients in these residues into mineral nutrients and return them to the soil. At the same time, they produce various extracellular enzymes and stimulants, promote the growth of plants, and enhance the resistance of plants to disease and stress, while some microorganisms also produce organic acids in secondary metabolism, maintain the weak acidic environment of the plant rhizosphere, hydrolyze the nutrients fixed by the soil, and increase the utilization of fertilizers. The higher the activity of microorganisms, the more favorable to the formation of humus, the more conducive to the formation of soil aggregates, thus affecting the physical structure and the form of chemical nutrients of the soil.

As the new cultivated soil has been compacted or artificially damaged, the numbers and types of microorganisms and protozoa in the soil are few, but through different methods of fertilization, the biological activity of newly added cultivated soil has been improved to varying degrees.

Tan Xiangping et al [28] adopted fertilization methods such as organic fertilizer, fungus fertilizer, and chemical fertilizer to fertilize the reclaimed rural homestead. It was found that the number of actinomycetes increased significantly after homestead soil was fertilized after one round of fertilization. Soil invertase, urease, phosphatase, aroylphatase, and dehydrogenase activities were all significantly or extremely significantly increased. Fan Wenhua et al [29] studied the effects of different reclamation years and reclamation modes on the bioavailability of reclamation soil in the Antaibao Open-pit Coal Mine, Pingyi County, and found that the total number of soil microbes increased gradually with the increase in reclamation duration. The landforms are quite similar, and in the top soil layer of 0 to 20 cm, the number of bacteria accounts for more than 95%, which is much greater than the number of actinomycetes and fungi. The level of the content is significantly positively correlated with the content of soil organic matter and alkaline dissolved nitrogen, to some extent indicates the abundance of soil nutrients.

2.3. Suggested measures to solve the problem
The main purpose of the consolidation of hollow village is to restore the occupied or idle land to a useable land and to use it as a land resource. However, the consolidation of hollow village needs to be comprehensively evaluated in terms of economic level, human environment, water resources, and soil conditions to determine its most appropriate use.

2.3.1. Development as a scenic spot. According to the size of the hollow village and its historical and humanistic conditions, building a new tourist site on the basis of new cultivated land is a good model for consolidation. It can not only develop the tourism industry according to local conditions, but also
create job opportunities for the villagers revenue, which both protects the environment and develops the local economy. The consolidation of hollow village into a scenic spot and development of rural tourism, whch Wuyuan County, Jiangxi Province is a relatively successful case [30]. In addition, the various types of resorts that have emerged in China are also a good model for the development and utilization of rural resources, which not only protects the local natural environment, but also exerts the functions of human resources, and in some cases increases income for farmers.

In addition, hollow village has been developed as a scenic spot, and there are many typical examples of reclamation in the mining area. Ge Shuhong [31-32] thinks that reusing a coal mine wasteland into a park Greenland can rehabilitate a large number of damaged coal mining sites located on the edge of the city or in the central city area into recreational green space with features of mining landscape, so that reclaimed land has the role of landscape, ecology, and economy. There are many examples of mining sites being reclaimed as tourist attractions in the country [33], such as Donghu attractions in Shaoxing city, Keqiao attractions in Shaoxing city, water parks reclaimed in Yongcheng coal mines, and rest places in the Kailuan Mining Bureau. All of them were reclaimed from mining areas into scenic spots, which created a certain amount of social benefits and economic income for the local area.

Therefore, according to local conditions, the direction of recultivation of abandoned land can be selected to maximize the function of reclamation land and reflect the value of reclamation land in terms of quality and quantity.

2.3.2. Conduct Conservation Tillage. Conservation tillage refers to agricultural production without severely disturbing the soil. The newly added soil is subject to greater human disturbance and the surface soil ecological environment is relatively fragile. Changing the cultivation methods and carrying out conservation tillage can minimize loss soil nutrient and improve soil physical and chemical properties. Jiang Xiaodong et al [31] studied the effects of different tillage methods on soil by comparing no-tillage, less-tillage, and straw mulching with conventional tillage. It was found that less tillage can significantly improve soil physical and chemical properties, increase soil water storage, and reduce nitrate nitrogen loss of leaching, which can increase crop production throughout the year.

Cai Jian [32] used bare land, film cover, straw mulching, and corn intercropping for soybeans to grow corn and soybeans. It was found that straw mulching and intercropping soybeans not only increase soil temperature, conserve water and fertilizer, but also increase soil humus content, improves soil physical and chemical properties. Zhao Hongli et al [33] determined soil physical properties after harvesting winter wheat by setting up three winter wheat plots with different cultivation measures such as no-tillage, subsoiling, and plowing. It was found that no-tillage increased soil bulk density, soil hardness. The content of agglomerates larger than 0.25 mm by dry screening and wet screening was higher than that of other treatments, and increased soil water storage and moisture infiltration rates. Zhou Lingyun [34] found that the use of straw to cover the wheat field can increase the temperature of the plough layer soil (0-50cm) by 0.5-2.5°C, increase the total soil porosity by 2%, increase the soil moisture content by 4.2%, and make the soil condition more suitable for plant growth. Yang Xueming et al [35] analyzed soil organic matter content, water infiltration rate and utilization rate, alfalfa quantity and crop yield by conservation tillage in different countries in North America. It was found that conservation tillage measures can increase soil organic matter content and soil biodiversity, and improve water use efficiency and it is recommended to promote application in China. Li Youjun et al [36] set up tillage patterns such as no-tillage cover, deep loose cover, one-time deep turning, and conventional tillage, and found that no-tillage cover compared with conventional tillage, the water use efficiency increased by 10.62%, the production efficiency of nitrogen, phosphorus, and potassium increased by 10.27%, 12.54%, and 12.19%, respectively, while wheat production also increased by 15.38%.

Conservation tillage has less artificial disturbance to the soil, it protects the relatively fragile soil surface, reduces soil loss, increases soil organic matter content, and improves ground temperature, which is conducive to the accumulation of soil nutrients to some extent.
2.3.3. For rapid fertilization. Newly-added land, because its fertility level is lower than that of conventionally-cultivated land, Therefore, in the process of use, the structure of the soil can be improved by increasing organic fertilizer or straw, etc., which has a high content of organic matter, so as to achieve the goal of fertilizing the soil.

Hua Ying [37] rapidly fertilized the cultivated land of rural homestead in Chongqing by adding organic fertilizer, ash residues, and bio-organic fertilizer. The results showed that organic manure fertilization can more effectively reduce soil gravel content, increase water stability of > 0.25 mm soil aggregates, increase soil organic matter, total phosphorus, alkaline nitrogen, available phosphorus, and available potassium content. The available phosphorus increased by 19-28% compared with the control. In addition, the organic manure fertilization method also increased the soil microbial biomass carbon, indicating that the application of organic fertilizer increased soil fertility, and the total amount of soil microorganisms also increased to a great extent. Cui Rongmei et al [38] found that adding organic manure and straw can significantly increase the particle size > 0.25 mm mechanical stability and water stability of aggregates by increasing the amount of organic fertilizer and returning corn stover in Weibei dryland. It also increased soil organic matter content and improved soil physical and chemical properties.

It is also possible to fertilize the soil by growing green manure plants. Green manure plants generally have low requirements on soil and are easy to grow. They can also fix their own nitrogen, grow green manure plants, which can increase the total amount of microorganisms in the soil to a certain extent. At the same time, green manure plants are forced to mature and can increase soil organic matter. And other nutrient content, so as to achieve the purpose of rapid fertilizing the soil. Zhang Shuo et al [40] plowed Ziyunying into the soil before planting rice, and found that this treatment method significantly increased soil nutrient content such as soil organic matter and alkali-hydrolyzed nitrogen, and significantly increased the yield of rice.

Increasing organic manure, returning straw, and planting green manure can all increase soil organic matter content to a certain extent, thereby improving soil physicochemical properties, increasing soil fertility, and increasing the ploughability of new land.

3. Conclusion
With the large number of hollow villages, abandoned rural homestead occupy a large amount of cultivated land resources, so it is necessary to rectify the land of hollow village homesteads. It is of great significance by analyze the suitability evaluation of hollow village reclamation, plan the rational use of new cultivated land for ensure the smooth progress of the rural abandoned Homestead reclamation and exerting the most appropriate role of land and resources.

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