ISSN: 2664-9640

Research on the vegetation and soil characteristics of ecological restoration of non-coal mine wasteland in the sandy and grassy beach area of northern Shaanxi

Xiaoying Wang, Pengyu Xie

Weibei Branch of Shaanxi Provincial Land Engineering Construction Group Co.,Ltd., Xi 'an, Shaanxi 710075, China

Abstract

The construction of ecological civilization is an important way and a key factor to achieve high-quality development. With the development of industrial civilization and the rapid development of productive forces, human beings are increasingly exploiting mineral resources.This paper takes Jingbian County, Yulin City as the research object, analyzes the current situation of the project area and the feasibility of ecological restoration, and proposes effective solutions for its existing problems, in order to provide some reference for ecological restoration work.

Keywords

Sandy and grassy beach area; non-coal mines; abandoned land; ecological restoration; soil characteristics.

1. Introduction

The increase in population size and economic and social development have led to an increase in the demand for natural resources. The development and utilization of natural resources has not only driven the rapid development of regional economies, but also caused the degradation of ecosystems and environmental pollution in some regions. This kind of unsustainable development The model of ecological system seriously restricts social and economic development, and various countries pay more and more attention to the importance of ecological restoration, and the restoration of ecosystems has gradually become one of the hotspots of current academic research.Since the 18th National Congress of the Communist Party of China, the Party Central Committee with General Secretary Xi Jinping at the core has attached great importance to the construction of ecological civilization, and has put forward the conclusion that "landscapes, forests, fields and lakes are a community of life", emphasizing that "the lifeblood of people is in the fields, the lifeblood of fields is in the water, and the water is the lifeblood of the fields. The lifeblood of the mountain lies in the mountain, the lifeblood of the mountain lies in the soil, and the lifeblood of the soil lies in the tree. The use control and ecological restoration must follow the laws of nature", "It is very necessary to uniformly protect and restore the mountains, rivers, forests, fields and lakes"; the 19th National Congress of the Communist Party of China The report attaches great importance to the construction of ecological civilization and green development, and proposes to take into account the coordination relationship between population, environment and development, and take the road of intensive, efficient, high-quality development and green development. The concept of ecological civilization is deeply rooted in the hearts of the people, and the construction of ecological civilization is in the ascendant.

ISSN: 2664-9640

2. Ecological restoration work progress and existing problems

The mining industry has promoted the development of human society and economy, but it has brought great challenges to the ecological environment, especially the formation of a large number of uneven and fragmented The severely damaged land in the mining area is in urgent need of ecological restoration. Northern Shaanxi is a large area of mineral resources, and it is also an important energy base of the country. Mineral resources play an important role in local economic development and have made important contributions to local social and economic development. However, the development and utilization of mineral resources in northern Shaanxi are generally relatively extensive, and the ecological and environmental problems are relatively prominent. Water resources damage and pollution, etc., will require a lot of funds for land maintenance and remediation in the later stage. The traditional regional development trades for social and economic prosperity at the expense of natural resources, and there are indeed problems such as resource depletion, environmental pollution, and ecological damage, which seriously affect the sustainable development of the regional ecological environment and social economy. The ecological security of the north wind sand and grass beach area poses a threat. While promoting regional economic development, mineral resources also give birth to deep-seated contradictions between economic development, resources and ecological environment.

The ecological restoration of the mining area is an inevitable requirement to promote the transformation and development of the mining area and achieve social and economic sustainability. It is also an important measure to promote the construction of ecological civilization and practice the concept of "lucid waters and lush mountains are invaluable assets". The development and utilization of mining areas should be based on the coexistence of economic development and good ecology, and fully consider the interests and needs of different generations, so as to ensure the safety of natural ecological processes, minimize the degradation of the environmental system, and maximize the maintenance of biological Diversity to achieve a win-win situation of economic and social development and good ecological environment.

3. Main practices for ecological restoration in mining areas

For the ecological environment of the damaged mining area, it can also be restored by relying on natural resilience, but the cycle is long. Therefore, it is very important to carry out artificial restoration in the ecological restoration process of the mining area. On the theoretical and technical levels of ecological restoration in mining areas, macroscopic control and engineering exploration are required, and new theories, technologies, methods, models, processes, materials, etc. need to be studied and put forward, so as to improve the theoretical and practical level of ecological restoration in mining areas, and maintain strengthening The strategic determination of ecological civilization construction, the exploration of a new path of high-quality development oriented by ecological priority and green development, and the transformation and upgrading of the industrial economic model of mining areas are of great significance for promoting the sustainable, healthy and stable development of the economy and society in northern Shaanxi.

Other countries in the world have done a lot of work on land reclamation and ecological restoration in mining areas, and each country has also promulgated laws and regulations related to ecological restoration in mining areas at different times. In recent years, the theoretical research on land reclamation in mining areas has become very active, mainly including clean mining technology and ecological protection of mine production, the impact mechanism of mining on land ecological environment and ecological environment restoration research, and biological reclamation without covering soil. And anti-erosion reclamation

process. The reason why the ecological restoration of mining wasteland in these countries can achieve good results is mainly due to their scientific and rigorous management process of ecological restoration of wasteland.

my country has also done a lot of work on land reclamation and ecological restoration in mining areas. Commonly used ecological restoration measures in mining areas include engineering measures and biological measures. The engineering finishing method adopts the method of combining mining with filling, stripping and storage. The goaf mainly adopts the stripping waste soil backfilling, covering soil and other finishing techniques; the dump site and the waste compacted land generally adopt the technology of land leveling, adjustment and fixing of the side slope by machinery. Other measures include covering soil for field construction, comprehensive utilization of mining wastes (coal gangue, fly ash, ash and slag), planting of pile-like landforms and other projects and biological reclamation, dredging and drainage of water, land leveling, terraced land subsidence, terraced fields, etc. The experiment of non-filling reclamation technology has significantly improved the land reclamation rate in the mining area. Biological measures is a comprehensive reconstruction and restoration technology, which combines ecology, environment, soil science, molecular biology, microbiology and other disciplines to work together. The main technical measures include soil improvement, plant planting, The coupled development of agriculture and animal husbandry, etc., this technology has a very good effect on improving the ecological environment, restoring the balance of the system, restoring the productivity of the land, and improving the level of agricultural production. By the end of the 20th century, the land restoration rate in my country's mining areas had reached 87.7%.

4. Construction conditions of the project area

The experimental site is located in Jingbian County, Yulin City, Shaanxi Province. The climate is semi-arid continental monsoon climate, with sufficient sunlight, large temperature difference between day and night, dry climate and four distinct seasons. The average annual rainfall is 395.4 mm (348.3-431.3 mm), and the average sunshine hours are 2768.2 hours (2516.1-3037.7 hours). 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 130 days (115-145 days). The soil is mainly loess soil, the texture is mainly light loam, the nutrient content is relatively low, it is loose and soft, easy to erode, and the soil erosion is serious. The total amount of water resources is 353 million m^3, and the available amount is 218 million m^3. The water quality is polycarbonate type water, suitable for irrigation, and the water quality is excellent.

5. Feasibility Analysis of Ecological Restoration in Mining Area of Jingbian County

With the enhancement of my country's economic strength and the improvement of ecological environmental protection awareness, people are paying more and more attention to the governance of the geological environment and the pollution of soil in abandoned mining areas. Yulin City in northern Shaanxi is a well-known mining resource city in my country, with natural resources covering 48 kinds of mineral resources in eight categories, including coal, oil, natural gas, and rock salt. However, in the past ten years, the urbanization process has increased the demand for urban construction land, and the new economic situation also requires Yulin City to speed up the transformation of a resource-based city. Therefore, under this trend, the existence of mines (especially abandoned mines) has brought serious ecological and environmental problems to cities, hindering local urbanization and sustainable development.

Jingbian County is an area rich in natural resources within the jurisdiction of Yulin City, and there are a large number of active or abandoned mining areas. Relying on the ecological restoration project of non-coal mine wasteland in Jingbian County, 7 major physical and chemical indicators such as soil bulk density were analyzed, and 2 ecological restoration measures, soil fertilization and vegetation planting were used to analyze the physical and chemical properties of contaminated soil after ecological restoration under different schemes. According to the changing characteristics, the project ecological restoration scheme suitable for the local abandoned mining area is proved, so as to provide a reference for the ecological restoration of the abandoned mining area in northern Shaanxi.

6. Problems and solutions

Due to the particularity of resource distribution and ecological requirements in mining areas, most of the current and abandoned mining areas are located in remote areas, especially the abandoned mining areas in the earlier period, most of which were located in mountainous areas and villages with few people and traffic congestion, which led to the research on related topics. The experimental area (sample) cannot be maintained in a timely and effective manner. At present, the more common research method is to sample contaminated soil, and then conduct off-site potted experiments in the laboratory or the location of the research unit. Although this method can better solve the problem of inconvenient maintenance of experimental records and samples, it cannot be accurately reflected or simulated. Due to the local climatic conditions such as light, temperature, precipitation, etc., there are certain differences between the experimental results obtained and the actual restoration results of the project, which cannot fully and accurately reflect the soil change process and actual improvement results after the contaminated land is restored.

Therefore, it is necessary to carry out potted experiments. The potted experiments are located in Jingbian County, Yulin City. The experimental environment is an open-air experiment. The experimental conditions are completely in line with the local climatic conditions such as light, temperature, and precipitation. The experimental results and the actual engineering restoration effect have high The data fitting relationship can truly and accurately reflect the soil change process and the actual improvement results after the ecological restoration of the contaminated land, which has important engineering practical significance.

More about this source textSource text required for additional translation information

References

[1] WANG Qiang, LI Rongrong. Journey to burning half of global coal: trajectory and drivers of China's coal use[J]. Renewable & Sustainable Energy Reviews, 2016,58:341-346.

[2] WANG J, TANG Y Y. The Multi-dimensional Dilemma and Its Solution of the Local Governments Taking the Lead in Peaking Carbon Dioxide Emissions Under the Vision of Carbon-neutrality[J]. Environmental Protection, 2021, 49(15): 31-36.

[3] YU H S. Practice and Thinking of Eco-Restoration of Regional Abandoned Mines[J]. Natural Resource Economics of China, 2021, 34(6): 84-89.

[4] LIU H L, ZHANG J, WANG Y Q, et al. Problems and Proposals of Solid Waste Utilization of Phosphate[J]. Multipurpose Utilization of Mineral Resources, 2017, (1): 6-11.

[5] WU X S, ZHANG W, YANG T T, et al. Development of Geometallurgy and Its Significance to the Construction of Wisdom Mines[J]. Multipurpose Utilization of Mineral Resources, 2021(5): 67-75.

[6] ZHANG N, ZHAO Y. Can China Achieve Peak Carbon Emissions and Carbon Neutrality:An Analysis Based on Efficiency and Emission Reduction Cost at the City Level[J]. Journal of Lanzhou University (Social Sciences), 2021,49(4): 13-22.

[7] YANG G, ZHANG S H, YANG Y S. Current Status and Prospects of Emission Reduction Technology for Gaseous Pollutants in Sintering Flue Gas[J]. Multipurpose Utilization of Mineral Resources, 2021, (1): 45-56.