

Status Quo of Land Degradation in Northwest China and Countermeasures for Prevention and Control

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Abstract: China is one of the countries in the world where land desertification and desertification have a large area, widespread distribution, and serious damage. Degraded lands in China are mainly distributed in the arid regions of the northwest. Land degradation not only directly endangers the survival and development of more than 1.4 billion people in China, but also seriously affects the living environment and quality of life of human beings, and it is urgent to prevent them. This paper analyzes the types and current status of land degradation in Northwest my country, and proposes corresponding prevention and control measures to better protect the severely degraded land, in order to provide some valuable theoretical references for subsequent research directions.

Keywords: Land degradation, Northwest, Status type, Control measures.

1. Introduction

The degraded land in China is mainly distributed in the arid areas of the northwest. In this region, the six provinces (autonomous regions) of Xinjiang, Inner Mongolia, Gansu, Qinghai, Shaanxi and Ningxia have an area of 2.1381 million km² of desertified land, accounting for 81.5% of the national desertified land area. The area is 1.4342 million km², accounting for 82.9% of the total desertified land area in China (Li Zhou et al., 2014). Land degradation also has a negative impact on the carbon cycle, and its prevention and control is urgently needed (Donia et al., 2020; Han Xu, 2019). Analysis and research on the status of land degradation can provide a good understanding of the state of the land, better and more suitable use.

Land degradation is formed by the combined action of natural and human factors. Natural factors only provide the external conditions and material basis for land degradation, while unreasonable human activities such as overgrazing, woodcutting, deforestation, industrial and mining construction, steep slope reclamation, and even pollution of land are the main causes of land degradation (Li Xinhui et al., 2019). Unreasonable human activities stem from the rapid increase in population, which increases the intensity of land resource utilization. Population growth has exacerbated the contradiction between man and land, leading to shortage of resources and even damage to the environment (Li Xiangfeng, 2017; Guo Xiaona et al., 2019). The impact of land degradation is not a simple land issue, but involves a multi-sectoral, cross-sector and cross-management major in agriculture, forestry, land resources and the environment, such as community development, land use, poverty eradication, and biodiversity conservation. question. With the use of computers and the development of remote sensing technology, scholars have begun to pay attention to the evaluation of land degradation. Remote sensing is the main method of land survey, while GIS spatial analysis is the main method for land degradation evaluation. The intersection of multi-discipline and multi-method should also be widely used in land degradation prevention and control.

2. Status of Land Degradation

Northwest my country is the region with the worst natural conditions and the most fragile ecological environment of land resources. Since the first year of the Great Western Development, the industrial structure of the Northwest has been dominated by resource development and high-energy-consuming industries, and land resources have suffered huge damage. The specific manifestations are "three land changes" - land desertification, desertification, salinization; grassland degradation, forest vegetation damage; serious soil erosion; environmental problems caused by land pollution are becoming more and more serious. Specifically include the following:

2.1. Desertification

Land desertification is an advanced stage type of land degradation in arid desert areas, and it is the fundamental cause of land degradation in Northwest China. Desertification is mainly caused by wind erosion, water erosion and salinization. Xinjiang and Qinghai are mostly dominated by wind erosion. Wind-eroded desertification also includes wind-accumulated semi-mobile sand dunes, which are mostly distributed in Xinjiang and Qinghai, Ningxia. In addition, near the oasis on the edge of the Tarim Basin in Xinjiang, due to the destruction of vegetation and firewood, fixed dunes have become semi-mobile dunes. In general, from 2000 to 2015, the desertification vulnerability of Inner Mongolia decreased significantly, and the area-level changes of high and non-vulnerable land were especially obvious. In 2015, the desertification vulnerability of Inner Mongolia was dominated by non-fragile and relatively high vulnerabilities, which were $4.02 \times 105\text{km}^2$, $2.32 \times 105\text{km}^2$, the area with the least high desertification vulnerability is $60,400 \text{ km}^2$, which are concentrated in the north-central part of Alxa League, the northwest of Bayannaoer City and the west of Xilin Gol League.

2.2. Land Desertification

The areas with the most serious desertification in the northwest region are Inner Mongolia and Xinjiang. Zhao Xinhua analyzed the current situation of desertified land

around Hulun Lake and put forward corresponding measures. The Hulun Lake ecosystem is an ecological barrier in the north of the motherland. Since the 21st century, the state has attached great importance to ecological construction and initiated the implementation of key ecological projects, which has greatly improved the desertification of the surrounding land. Zhou Jingshan et al. analyzed the local dynamic changes of the Mu Us Sandy Land in Inner Mongolia from 2009 to 2014 and their causes. Mu Us Sandy Land is one of the four major sandy lands in China. It is located in the desert-loess boundary zone. It is a transition zone between arid, semi-arid and sub-humid aridity. It is concluded that the desertification trend of the Mu Us Sandy Land has been basically contained, the degree of desertification has been reduced with the significant increase of vegetation coverage, the overall ecological environment of the sandy land has been basically improved in recent years, and the trend of ecological environment deterioration has begun to gradually reverse, which means that in recent years, the ecological environment in this area is gradually improving. Zhang Jie conducted a preliminary discussion on the monitoring methods of desertification land in Xinjiang. Xinjiang is the province with the largest desert area, the most widespread distribution and the most serious damage in China, and 2/3 of China's deserts are distributed in Xinjiang. The desertified land in Xinjiang is not only widely distributed, but also has developed and changed rapidly in the past 100 years, which has brought great harm to the ecological environment and social and economic development of Xinjiang. Land desertification has become a serious environmental and social problem in Xinjiang. Sand work has always been a top priority for the Xinjiang government and forestry departments. Combined with the "3S" technology to monitor the desertified land, it can better monitor the dynamic changes of the desertified land, grasp the latest situation, and control the desertification situation well.

2.3. Soil Salinization

The process and mechanism of soil salinization are complex. Its formation is a form of land degradation under the influence of natural factors and human activities. Due to the dry climate in Northwest my country, salinization is also common and covers a wide area. At present, the national salinized soil area is about 36.67 million km², and the cultivated land threatened by salinization in Inner Mongolia, Xinjiang, Gansu, Ningxia and other places accounts for about 30% to 40% of the total local cultivated land area. Based on remote sensing and GIS technology, and using Land set TM/ETM data temporal and spatial evolution, Guo Meishu et al. concluded that the saline-alkali land in the Hetao Irrigation Area has experienced a process of shrinking-slow expansion-shrinking in the past 30 years, but the overall trend is shrinking, indicating that salinization The problem has improved to some extent. In 2019, the areas of land salinization in the five provinces of Xinjiang, Shaanxi, Ningxia, Gansu and Qinghai were 1.13 million km², 56.3 thousand km², 1.6165 million km², 1.3877 million km² and 840.91 million km² respectively. Li Yi and Wang Baozhou conducted research on the characteristics of soil salinization in arid areas, focusing on the current situation of soil salinization in Jingdian Irrigation Area in Gansu Province, and using the vertical distribution characteristics of the index area to analyze and study the salinization of each layer of soil. Among them, the total salt content showed the phenomenon of high salt content in the surface layer and bottom layer, and

low salt content in the middle layer, that is, the soil in the irrigation area had the phenomenon of bottom aggregation and salt accumulation, and the salt content of each layer had strong variability. Yang Liangyan and Cheng Jie conducted remote sensing monitoring research on the ecological environment of Botan saline land in Shaanxi. The composition of the flood land in the Lubotan area is mostly high-salt river and lake sediments. Fragile, seriously affecting agricultural production and food security in the region.

3. Land Degradation Prevention Countermeasures

Land degradation is the result of a combination of natural and human factors. Natural factors are the basic potential factors of land degradation, while human activities are the inducing factors of land degradation. Land has both natural and socio-economic attributes. The prevention and control of natural land degradation also has this feature. As one of the countries with the most serious land degradation in the world, China has a large population and low per capita land resources. To achieve sustainable development, it is necessary to take corresponding targeted governance measures for different degradation processes.

3.1. Policy Guidance, Adapting Measures to Local Conditions, Comprehensive Management, And Developing Characteristic Sand Industry to Help Farmers in Sand Areas Get Rid of Poverty and Become Rich

The prevention and control of land degradation is multifaceted, including farming system problems and engineering technical problems. Land resources, biological resources and environmental conditions should be unified, and comprehensive management measures for sustainable development should be adopted. Protecting and restoring vegetation is a key measure to prevent land degradation. Because vegetation not only has many ecological functions, but also can prevent and control land desertification and degradation on a large scale, so great attention should be paid to the protection and restoration of vegetation. First of all, carry out comprehensive management according to local conditions in areas with imbalanced ecological balance. For example, in the agricultural and animal husbandry interlaced areas in the north, it is forbidden to destroy grass to create fields, and use the combination of arbor and irrigation and cultivate grassland to control wind and sand. The Loess Plateau should focus on soil and water conservation, prohibit steep slope reclamation, and plant grass and afforestation to improve soil fertility and crop yield per unit. Secondly, according to the bioclimatic characteristics, rationally arrange the agricultural layout. In my country, except that the eastern part is mainly agricultural areas and the western part is mainly pastoral areas for regional production, intensive farming is carried out in areas where conditions permit. Third, pay attention to the all-round development of agriculture, forestry, animal husbandry and fishery, carry out basic construction of farmland such as soil improvement and water control, gradually establish an optimized agricultural ecosystem, and achieve the purpose of comprehensive prevention and control of soil degradation.

3.2. Plant Windbreaks and Sand-Fixing Plants, And Build Ecological Natural Restoration Projects

The root system of plants can effectively slow down the process of land desertification. It is like a net to firmly fix the soil, and the plants themselves can weaken the surface wind, thereby slowing down soil erosion, which is also widely used in practical soil and water conservation work. Plant windbreaks and sand-fixing plants in areas with severe soil erosion to effectively control soil erosion. Planting windbreaks and sand-fixing plants is the most economical and effective method. Therefore, plant planting should be vigorously promoted in areas of soil erosion and land desertification, and the investment in later maintenance of plants should be increased to benefit future generations.

3.3. Carry Out Scientific Research and Monitoring, Develop Ecological Agriculture, And Build an Evaluation System

Science and technology is an important guarantee for the success of land degradation remediation. The primary consideration in the environmental aspect of land degradation management methods must be to be able to build a virtuous circle of ecosystems locally. Usually, the target area is not suitable for the growth of commercial crops, and the climate environment is harsh, so ordinary plants cannot survive, so we use artificial transformation. In this way, plant genes are transformed through biological and botany-related technologies, and species that can adapt to the local climate are cultivated. Secondly, engineering facilities are used to create desertification control belts. Relying on the government's annual control investment, the control area is expanded year by year, and finally the species can grow and reproduce by itself. purpose, so as to achieve the purpose of governance. We can use the land desertification rating system to select the governance plan with the highest priority based on national data and local actual conditions, so as to open up the communication channel of desertification information between the local and the central government, so that the governance process is no longer independent, but is integrated with the national The desertification control is synchronized with the control process.

4. Discuss

The northwest region has an important strategic position in my country's economic construction, national defense security and social stability, and its special natural and geographical conditions are extremely important ecological barriers in my country. , and take corresponding measures according to the actual situation - combining desertification with people's livelihood; planting windbreaks and sand-fixing plants; forming a new and applicable pattern of land resource governance and supervision. The process of ecological civilization construction in Northwest China.

With the continuous development of high and new technology, we will have methods with lower cost, shorter treatment time and better treatment effect in the treatment of land desertification, and people's awareness of environmental protection will also be affected by the surrounding environment and human factors. Under the influence of the gradual increase, the area of land desertification in my country will gradually decrease, or even disappear completely, which is the inevitable result of land desertification control in my country in the future. Now we should be more respectful, pay enough attention to the issue of land desertification, and at the same time treat the results of governance more rationally, not blindly seek quickness, nor lie and falsely report the results of governance, and closely focus on President Xi Jinping's concept of "a community with a shared future for mankind". , build a modern land desertification control system with Chinese characteristics.

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