

Study on ecological protection and vegetation restoration model of power transmission and transformation project construction in typical ecologically fragile areas in western China in the new period

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Abstract. In the new era of construction development, ecological poverty caused by the deterioration of ecological environment has become one of the regional characteristics of poverty in the western region, therefore, to the typical ecological fragile areas of power transmission and transformation construction problems, ecological protection and vegetation restoration, is the main problem of our country's scholars. After understanding the basic status quo of ecologically fragile areas in western China, this paper mainly studies the ecological protection and vegetation restoration model of power transmission and transformation construction in typical ecologically fragile areas in western China in the new era according to the impact of power transmission and transformation projects on ecological environment, so as to provide basic guarantee for engineering construction and industry development.

Keywords: western region; Ecologically fragile area; Power transmission and transformation projects; Ecological protection; Vegetation restoration.

1. Introduction

In the rapid development of social economy and science and technology, the restoration and reconstruction of degraded ecosystems, as a new research topic concerned by the ecological field, geographical field and regional scientific development, aims to optimize the allocation and scientific development and application of natural resources, not only to protect the current natural ecosystem, but also to obtain rich economic benefits. The ultimate guarantee is that the ecosystem and the economic system can develop in harmony. In essence, ecological restoration and reconstruction refers to the rational use of biological, ecological, engineering and other technical methods based on ecological principles to artificially change or cut off the leading factors or processes of ecosystem degradation, comprehensively optimize the flow process and space-time order within the system and with the outside world, and ensure that the structural function and ecological potential of the ecosystem can be restored to the original level. It can be raised to a

higher level if conditions permit. For the typical ecologically fragile areas in western China, ecological protection and vegetation restoration have the following significance: First, ecological significance. As the main source of China's great rivers, the western region, like the Yangtze River and the Yellow River, is an important ecological barrier in China, and the local ecological environment quality directly affects the pace of ecological economic development in China. In the construction and management of power transmission and transformation projects, strengthening ecological protection and establishing and promoting vegetation restoration models can not only improve the coverage rate of local vegetation and reduce soil erosion, but also improve the anti-interference ability and self-organization ability of the ecological environment system in the region, so as to ensure the stability and balance of the system. Secondly, social significance. For power transmission and transformation projects in typical ecologically fragile areas in western China, ecological protection and vegetation restoration is a social system project involving many aspects and the participation of the whole people. It is also an important case of environmental protection education for the whole country, which can improve the awareness of crisis and protection of social residents and institutional cadres, and guide people to establish the concept of civilized ecology and interpersonal relations. Finally, it can ensure the harmonious development of ecological environment and social economy; Finally, political significance. As an important minority gathering area in China, both economic development and environmental improvement affect national defense security and national unity. Therefore, from the perspective of construction management of power transmission and transformation projects in ecologically fragile areas, it is of great significance to strengthen ecological restoration and reconstruction, comprehensively improve the local economic development environment, and promote all-round social and cultural progress for the construction of the socialist road with Chinese characteristics.[1-3]

From the perspective of power transmission and transformation project construction management, practical work is mainly divided into two parts, on the one hand refers to the transmission line, on the other hand refers to the substation, so the construction scope during the project construction is very wide, to comprehensively consider the risk caused by all aspects, put forward a standardized and institutionalized management system, only in this way can fundamentally reduce the risk of project construction and operation. According to the construction of power transmission and transformation projects in typical ecologically fragile areas in western China in recent years, common problems are mainly reflected in the following points: First of all, the staff's safety awareness is too low, during the on-site construction management did not fully implement their own job responsibilities, did not strictly review the project in accordance with the requirements of the regulations, resulting in project construction problems are not found in time, and further increase the potential risk of project operation; Secondly, there are a large number of risk factors in project construction. The scale of engineering construction and construction is too large, and the required technical equipment requires higher requirements, which will increase the risk factors of power transmission and transformation projects. Finally, the construction environment of the project is poor, and there are often irresistible influencing factors during the construction, and these problems will directly affect the construction cycle and construction quality of the project. At the same time, in order to complete the construction project as soon as possible, most construction units do not strictly follow the rules and regulations and design schemes, which leads to great potential risks in the overall power transmission and transformation project. Therefore, after understanding the construction management requirements of power transmission and transformation projects in typical ecologically fragile areas in western China, this paper mainly

studies the ecological protection and vegetation restoration mode of power transmission and transformation projects in typical ecologically fragile areas in western China in the new era.[4-6]

2. Method

2.1 Tianshan Mountain Area

According to the vegetation restoration and protection system shown in Figure 1 below, ecological protection and vegetation restoration in Tianshan Mountain area are mainly reflected in the following aspects: On the one hand, ecological protection mode. In order to reduce the impact of the power transmission and transformation project on the original ground, the construction scope should be determined according to the design roadmap before the project construction, the construction area should be strictly planned using colored flag strips, and the construction area should be minimized and the scope of mechanical or manual activities should be reduced without affecting the construction process. At the same time, in order to reduce the surface disturbance of the project area during the construction process, the construction unit should gradually optimize the construction technical means and comprehensively accelerate the construction speed. In addition, in view of the harsh hydrological environment and excessive concentration of rainfall in the local mountainous and slope areas, intercepting ditches and slope protection should be set up in the construction area to prevent dredging, reduce the kinetic energy of slope runoff, effectively disperse rainfall runoff, and avoid man-made soil and water loss. On the other hand, vegetation restoration model. In the case that the site conditions do not allow, the development zone and operation area of the ecological environment can be completely restored according to the natural needs, the impact of the project on the original vegetation after construction can be cleared, and the grass seed or shrub can be planted according to the site conditions.

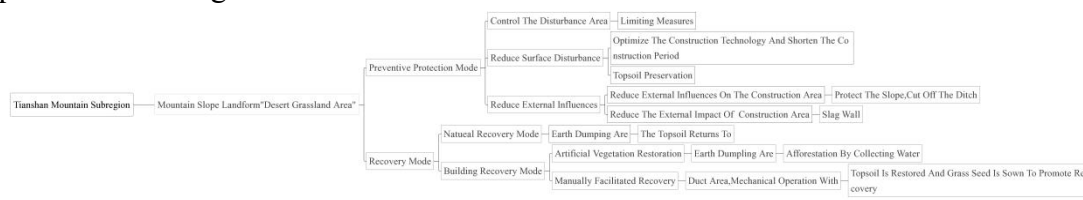


FIG. 1 Vegetation restoration and protection system in Tianshan Mountain area

2.2 Desert Gobi area

According to the analysis of vegetation prevention and protection system as shown in Figure 2 below, practical work is mainly reflected in the following points: First, reduce the disturbance area. Before the construction of the project, it is necessary to determine the construction direction and facility scope according to the construction drawings of the power transmission and transformation project, control the construction area as much as possible on the basis of strict planning, reduce the scope of technical equipment and manual activities, and protect the stability of the ecological environment of construction activities; Second, reduce surface disturbance. In order to reduce the surface disturbance in this area, it is necessary to choose the form of geomembrane covering before soil piling in the local temporary soil piling area, so as to reduce the surface disturbance in the soil piling area. Finally, reduce the impact of external environment on the construction area. During the construction and development of power transmission and transformation project, the influence of wind erosion should be reduced by gravel gland.[7-9]

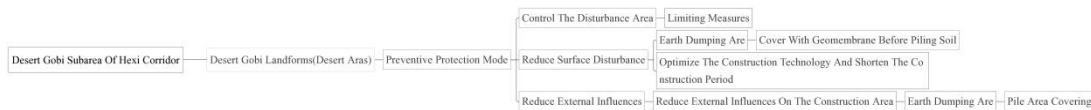


FIG. 2 Vegetation prevention and protection system in desert Gobi region

2.3 Dry grassland area of Loess Plateau

According to the analysis of the vegetation restoration system architecture diagram shown in Figure 3 below, vegetation restoration should start from two aspects: on the one hand, natural restoration mode. The original vegetation and the 0.3-meter thick soil on the surface should be piled into suitable places as far as possible, and then fully applied to the vegetation restoration area after the construction is finished. On the other hand, artificially promoted recovery models. By fencing off the construction area, the plant community can be significantly changed, and the height, density and coverage area of vegetation will increase accordingly, which can guide the plant community to a benign development.

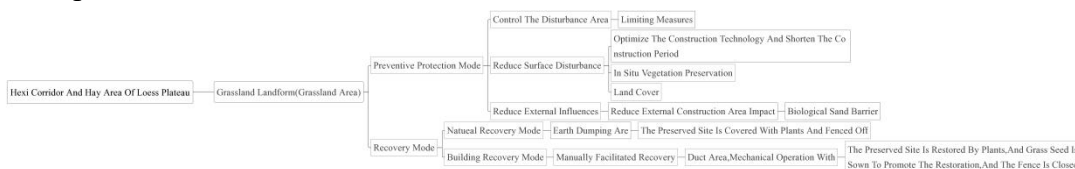


FIG. 3 Vegetation restoration system of steppe in loess Plateau

3. Result analysis

3.1 Case Analysis

Based on the structural analysis of the formation mechanism of ecological poverty shown in FIG. 4 below, we can see that the main reason for the occurrence of poverty in western China is the deterioration of ecological environment. The poor people mainly live in the ecologically fragile zones in western China, such as the boundary zone between land and water, the ecologically fragile zone between agriculture and grazing, the dry and wet zone, and the forest edge zone. However, it has high sensitivity, swing and uncertainty, weak resistance to external interference, and extremely fast interface change rate. In the construction of power transmission and transformation projects in this area, ecological protection and vegetation restoration must be considered comprehensively.

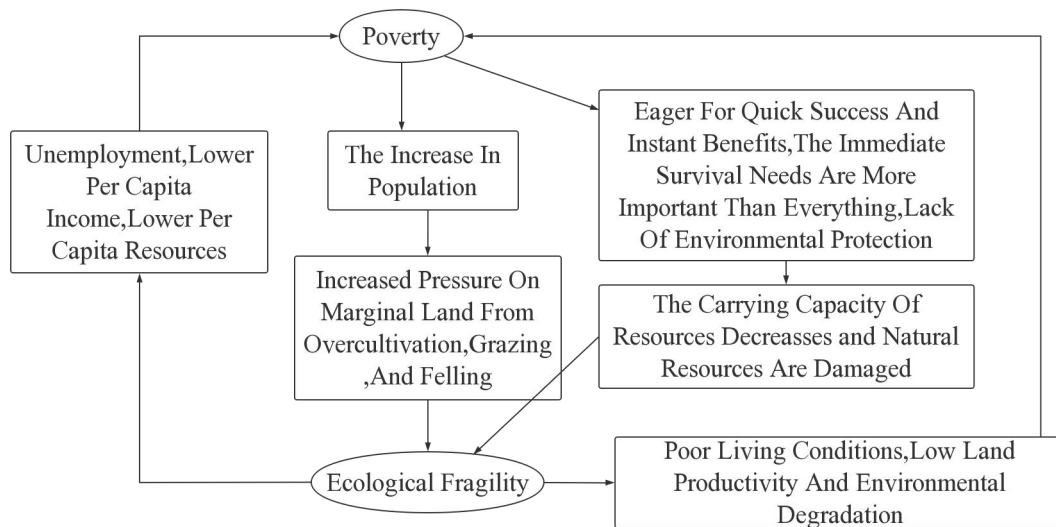


FIG. 4 Formation mechanism structure of ecological poverty

According to the distribution regions and ecological environment of poor counties in western China, the fragility and unsustainability of ecological environment in western China is the main cause of local poverty, as shown in Table 1 below. Due to its remote location, inconvenient transportation and poor natural conditions, the local economic development level is low, the industrial structure is relatively simple, and the production mode is relatively backward. In the construction of power transmission and transformation projects, according to the ecological environment and production needs of different regions to provide power, we must develop targeted ecological protection and vegetation restoration measures.[10-12]

Table 1 Ecological environment and poverty distribution in western China

	Number of poverty-stricken counties	distribution area	Ecological characteristics
Farming-pastoral ecotone in northern China	60	Including Hebei, Inner Mongolia, Shanxi, Shaanxi and Ningxia.	Grassland degradation and land desertification are very serious problems. It is a traditional soil erosion area in China, which is inlaid with agriculture and animal husbandry. Sometimes farming and sometimes grazing, the agricultural system fluctuates greatly.
Serious soil erosion area in loess plateau	130	North of Qinling-Funiu Mountain, south of Yellow River Hetao and Yinshan Mountain, west of Taihang Mountain and east of Sun Moon Mountain, involving northern Shaanxi, western Inner Mongolia, southern Ningxia, Longdong and Hexi areas and eastern Qinghai, and involving most parts of Shanxi Province.	The largest loess plateau in the world is the main source area of sediment in the Yellow River, because of its broken terrain, criss-crossing gullies, loose soil and arid climate, which leads to serious soil erosion.

Qinba mountain area	50	Located at the junction of Sichuan, Shaanxi, Henan and Hubei provinces	The mountains are high, the valleys are deep, the ecological environment is deteriorating, and soil erosion is serious.
Southwest karst plateau hilly area	130	With Guizhou as the center, it includes Guangxi, Yunnan, Sichuan and other provinces, as well as parts of Hubei and Hunan.	The world's largest karst plateau is characterized by widespread limestone, high karst degree, poor soil layer, serious soil erosion, lack of cultivated land, small environmental capacity and serious rocky desertification.
High mountain and canyon area of Hengsi Mountains	40	Including parts of Sichuan and Yunnan provinces to the west of the Yalong-Yuanjiang line, are enclosed in the alpine valleys of the Nujiang River, Lancang River and the upper reaches of Jinsha River.	The mountain is high and steep, the traffic is blocked, The cultivated land is dominated by steep slopes (with a slope of more than 25 degrees), with heavy precipitation, loose rocks, complex structure, prominent landslide and debris flow disasters and serious soil erosion.
Ecological fragile area of Qinghai-Tibet Plateau	40	Xinjiang, Qinghai and Tibet provinces	The altitude is too high, the climate is cold, and the water source is extremely scarce. The desertification area is constantly expanding, and the sandstorm disaster is serious. Moreover, the area is remote and the traffic is inconvenient.
Source: this classification mainly refers to the research of Wang Jian, Liu Yanhua and others, and is obtained after sorting out.			

3.2 Protection Measures

First, the design phase. In the design of power transmission and transformation project, the construction unit should choose several line schemes and put forward the appropriate power transmission and transformation line schemes from the Angle of ecological environmental protection. In this process, according to the ecological sensitivity along the line, the construction unit should scientifically identify the species-sensitive areas, such as the distribution area of ecological animals and plants under key protection, the distribution area of rare and endangered animals and plants, and at the same time scientifically select the construction site and tower type, giving priority to the construction scheme with small ecological impact and small footprint, so as to reduce the construction and operation of power transmission and transformation projects. Impacts on the stability of local ecosystems.

Second, the construction phase. In the design of power transmission and transformation projects in nature reserves, it is necessary to design construction plans according to the legal provisions of our country, and arrange professional personnel to conduct on-site investigation and audit, so as to ensure that the construction of the project does not violate the legal provisions and will not affect the ecological sensitive areas in the western region. At the same time, it is necessary to make

preparations during the construction period, organize planning in strict accordance with the requirements of project construction management, accelerate the construction process and shorten the construction period as much as possible, avoid construction during the breeding of wild animals and plants, and reduce the impact of power transmission and transformation projects on wild animals and plants. In addition, during the construction period, it is necessary to organize internal employees to carry out ecological environmental protection education, carefully understand the plant characteristics and growth needs of the local ecologically fragile area, strictly arrange the site in accordance with the scope of the construction station, as far as possible to reduce the damage to animals and plants, and apply materials and technical means to meet the local environmental protection requirements to avoid unnecessary safety problems in subsequent operation.[13-15]

Finally, the operational phase. In the operation stage of the power transmission and transformation project, the construction unit should regularly organize the construction personnel and maintenance personnel of the power transmission and transformation line to learn professional legal knowledge, actively cultivate the ecological protection consciousness of the employees, and comprehensively implement the vegetation restoration measures proposed by the construction management of the project. At the same time, the line operation unit should establish a good cooperative relationship with the management department of China's nature reserve, jointly participate in the vegetation restoration and treatment work, and meet the local natural conditions, in order to give full play to the unique role of power transmission and transformation projects.

Conclusion

To sum up, since the construction and operation of power transmission and transformation projects will be affected by various factors and pose a threat to the ecological environment of typical ecologically fragile areas in western China, appropriate protection measures should be put forward during the construction and management period, vegetation restoration should be fully implemented, and animals and plants in local nature reserves should be actively protected. Only in this way can we ensure the coordinated and steady development of power transmission and transformation projects and ecological and natural systems, provide sufficient electric energy for poor areas in the west, and will not affect the stability and security of the local ecosystem.

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