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Research on ecological restoration strategies of mountains, rivers, forests, fields, lakes and grasses in Mount Tai

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Abstract: *In recent years, coordinating and promoting the comprehensive management of the ecosystems of mountains, rivers, forests, fields, lakes and grasses (M-R-F-F-L-G) is one of the priorities of the country. The ecological protection and restoration project of M-R-F-F-L-G in the Taishan area is the second batch of national pilot projects for ecological protection and restoration of M-R-F-F-L-G. It is an important part of the major ecological protection and restoration projects in the key ecological areas of the Yellow River. This study takes Taishan ecological area as an example, discusses the significance of the project on the basis of analyzing the specific implementation of the project, and proposes corresponding solutions for the existing problems, in order to provide scientific guidance for the systematic restoration of the ecological environment.*

Keywords: *Mountains, rivers; forests; fields; lakes and grasses; Ecological protection and restoration; Systematic; Taishan ecological area*

1. Introduction

Since the 18th National Congress of the Communist Party of China, the government has put forward a series of new ideas, new strategies and new methods in ecological protection and restoration. In 2013, General Secretary Xi proposed that *M-R-F-F-L-G* is a community of life. In 2015, the Central Committee of the Communist Party of China and the State Council put forward the concept that the establishment of mountains, water, forests, fields, lakes and grass is a community of life. The concept of " *M-R-F-F-L-G* is a community of life" shows that the country attaches great importance to ecological protection and restoration, which is a powerful measure to implement green development, and is related to my country's ecological civilization and sustainable development process.

Since the concept was put forward, domestic scholars have successively carried out research on it. The initial research focused on connotation and theory, and some scholars put forward the philosophical spirit and practical significance of *M-R-F-F-L-G* [1]. Starting from the basic connotation of the governance of the *M-R-F-F-L-G*, some scholars introduced the integrity, stability and health of the ecosystem, and summarized the content of the protection and restoration of *M-R-F-F-L-G* from seven aspects[2]. Subsequent scholars began to explore the restoration methods and technologies of *M-R-F-F-L-G* community, and applied them in practice. Some scholars have proposed a systematic evaluation method based on "objective-constraint-cost" [3]. Some scholars have also proposed design ideas in terms of layout, standards, and engineering [4]. At present, there are many studies on the diagnosis of ecological problems, and many scholars have established different ecological risk assessment systems to diagnose ecological problems in the region.

2. Significance of restoration of mountains, waters, forests, fields, lakes and grasses in Mount Tai

Mount Tai is the first of the Five Sacred Mountains. The mountains stretch for hundreds of kilometers from east to west and thousands of square kilometers. Mount Tai area is a key area related to the sustainable development of the Chinese nation's culture, an important ecological barrier in the North China Plain and a key source area for regulating, storing and replenishing the east route of the South-to-North Water Diversion Project. The Taishan ecological zone is rich in mineral resources and intensive mining development, and the resulting problems of mine geological environment are very

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prominent. Ecological restoration of M-R-F-F-L-G in this area will help promote the harmonious development of the Mount Tai, build the spatial structure advantage of the "Taishan Ecological Belt", and provide safe water supply for the South-to-North Water Diversion Project.

3. Ecological and environmental problems in Mount Tai area

The geological environment of Mount Tai is complex, and it is a high-prone area for geological disasters. The intensity of human engineering activities is high, and there are many environmental problems in mines. The topography and landforms are damaged obviously, the vegetation coverage rate is reduced, and the ecological environment is fragile. The carrying capacity of the water environment is seriously insufficient, and the problem of water ecological environment damage is emerging. The urbanization rate of the Dawen River Basin is low, the problem of non-point source pollution in agriculture and rural areas is prominent, and some tributary river sections are heavily polluted, causing potential risks to the water quality and safety of the eastern route of the South-to-North Water Diversion Project. Some drinking water supply areas have hidden dangers of pollution. There are still large areas of bare rock and barren mountains in the region, the forest coverage rate is reduced, the ecological functions such as water conservation and soil and water conservation have deteriorated, and the biodiversity status needs to be enhanced.

Goaf subsidence and open-pit mining have caused land damage, the area of arable land has been greatly reduced, and the reserve resources are seriously insufficient; the extensive use of pesticides and fertilizers has caused soil pollution. Dongping Lake is the last storage lake of the east route of the South-to-North Water Diversion Project. In recent years, there has been a shortage of ecological water in the upper reaches. The drought has reduced the area of wetlands, and the functions of some wetlands have been degraded. Ecological restoration is urgently needed.

4. Implementation path of ecological protection of M-R-F-F-L-G in Taishan

4.1 Principles of ecological restoration of mountains, rivers, forests, fields, lakes and grass depths

Adhere to the principle of people-oriented and ecological harmony: the Taishan ecological area is a complete ecological functional area with complete natural ecological elements, and is the most important ecological barrier in the North China Plain. The restoration project of M-R-F-F-L-G in Mount Tai needs to adhere to the principles of people-oriented and ecological harmony, carry out various tasks according to local conditions, improve environmental quality, ensure ecological security, and form a new pattern of harmonious development between man and nature.

Adhere to the principle of overall planning and highlighting the key points: ecological restoration must adhere to the important concept of "mountains, waters, forests, fields, lakes and grasses are a community of life", and carry out overall protection, systematic restoration and comprehensive management of natural ecological elements, and implement classified implementation.

Adhere to the principle of departmental linkage and coordinated promotion: in the process of ecological restoration projects, we should adhere to the government-led and departmental linkage, do a good job in planning linkage and coordination with various sectors and departments, and ensure the orderly promotion of all kinds of projects.

Adhere to the principles of scientific design, careful construction and strict management: strengthen the investigation and demonstration of regional ecological environmental problems, highlight the problem orientation, take effective measures, and scientifically formulate the design of ecological protection and restoration projects. In the construction, we should adhere to the seriousness of design, strictly implement all kinds of norms and standards, strengthen the supervision and management of quality, strictly investigate the responsibility, ensure the quality of construction, and build it into a high-quality project with demonstration significance in the whole country.

4.2 Implementation path of ecological restoration of mountains, forests, fields, lakes and grass

According to the present situation of regional ecological environment problems in Mount Tai., the ecological protection and restoration projects of water, forest, field, lake and grass in Mount Tai. can be divided into five categories, namely, mine geological environment control projects, land comprehensive improvement projects, geological disaster prevention and control projects, geological park and

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geological heritage protection projects, watershed ecological environment control projects.

Mine geological environment control projects: Taishan area is rich in mineral resources and has a long history of mining. While providing energy security, many problems have also occurred, such as ground subsidence, aquifer damage, landscape damage, vegetation coverage reduction, and biodiversity reduction, which seriously affect the mining area and surrounding human settlements and air quality. According to the existing problems, the governance of mine geological environment mainly includes the following aspects. The first is the management of empty collapse. After coal mining collapses in hilly and mountainous areas, the surface morphology changes little, and there is no water accumulation. The local collapse pits and cracks cause damage and deformation of cultivated land, roads and water conservancy facilities. During the reclamation, the main purpose is to fill the pits and cracks, level the land, and build horizontal terraces. After coal mining collapse in the plain area, the surface morphology is seriously damaged. According to the reclamation method, it can be divided into two categories: infill reclamation and non-infill reclamation. The second is mine ecological restoration. Due to the destruction of the overlying land and vegetation resources, exposed rock slopes and a large amount of barren land have been formed. In order to create a good ecological environment, the stope needs to be comprehensively treated. The third is to use filling method and isolation method to control the goaf of the mine. Fourth, comprehensive renovation of abandoned mine shafts can be carried out, which can be transformed into water wells or landfilled and plugged. Fifth, treat ground fissures. Such cracks are not suitable for growing commercial crops and can be filled.

The comprehensive land improvement project mainly includes three aspects. The first is to remediate agricultural land, vigorously promote the consolidation and development of agricultural land, supplement the quantity and quality of cultivated land, improve the efficiency of land use, and improve the pattern of land use. The second is to take remediation measures for the reserve land resources suitable for cultivation, increase the area of cultivated land and improve the ecological environment. Thirdly, renovate and utilize the abandoned industrial and mining land, remove ground garbage, plant ornamental trees or improve it into farmland, leisure squares, etc.

The comprehensive management of geological disasters mainly includes monitoring and forecasting, avoidance, restrictive measures and engineering measures. Monitoring engineering is widely used. By analyzing and interpreting relevant data during the detection process, the development trend of the disaster body can be predicted in time, and the next step of disaster prevention work can be guided. Avoidance is an effective and economical preventive measure. For example, during the flood season or dangerous period, the flood season should be used to avoid the possible hazards caused by geological disasters; prominent warning signs should be set up in the dangerous area to remind local residents and relevant personnel to pay attention; roads, water conservancy facilities or other major projects In the construction of facilities, try to avoid geological disaster-prone areas or dangerous areas of geological disasters. When it is difficult to avoid them, corresponding engineering measures must be taken to ensure safety.

The protection of geoparks and site relics mainly includes the protection of site relics, the construction of a sign protection system, the construction and publicity measures of a popular science education base for geological relics, and the development of scientific research.

The ecological environment management of the river basin must firstly carry out the prevention and control of water pollution in the whole process, and strengthen the comprehensive control of industrial pollution, urban domestic pollution and rural environmental pollution. The second is to promote water conservation and recycling. Implement the strictest water resources management system, strictly control groundwater overexploitation, improve water use efficiency, and strengthen water resources protection. The third is to strengthen ecological protection and restoration. Strictly abide by the ecological red line. Important areas closely related to the water ecological environment, such as important water areas, biodiversity reserves, nature reserves, drinking water source reserves, and water source conservation areas, shall be included in the ecological red line protection scope. Strengthen wetland protection and restoration, carry out restoration of degraded wetlands, and in accordance with the principles of government leadership, economic compensation, and market promotion, within the flood control levees of rivers and lakes, according to local conditions, return farmland to wetlands and fishing to lakes, and guide farmers to actively adjust the planting and breeding structure. Ensure the safety of drinking water quality. Strengthen the supervision of the whole process from water source to faucet. Complete the baseline survey of drinking water quality as soon as possible, and determine key monitoring and monitoring water quality indicators.

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5. Benefit Analysis of Ecological Protection of Mountains, Waters, Forests, Fields, Lakes and Grasses in Taishan Area

Carrying out ecological protection and restoration of M-R-F-F-L-G in the Taishan area, the benefits are mainly reflected in the three aspects of environment, economy and society.

Environmental benefits: Carrying out the ecological protection and modification project of M-R-F-F-L-G can effectively increase the environmental carrying capacity, improve the environmental quality, build an ecologically friendly, beautiful environment, a life community with perfect functions and sustainable culture, and build the Taishan ecological belt, which is the North China Plain. Build important ecological barriers. Through the implementation of the ecological restoration project, the area of bare rock and barren hills will be further reduced, the vegetation coverage will be increased, the types of forest landscapes in the mountain farms will be better enriched, and the comprehensive prevention and control capabilities such as water conservation, soil and water conservation, and forest fire prevention will be greatly improved. At the same time, it provides a variety of habitats for various wild animals and plants, and will significantly improve the ecological carrying capacity and comprehensive ecological benefits of mountain forests. Through the implementation of ecological restoration projects, it will effectively protect and restore geological and landform landscapes, strengthen the conservation and recycling of water resources, effectively protect and restore biodiversity, effectively degrade pollution and purify water quality, effectively adjust regional climate and enrich landscape levels, improve Eco-tourism environment, improve the carrying capacity of the ecological environment, promote the common development of M-R-F-F-L-G, provide a good living environment for the people, and create a new situation of harmonious coexistence between man and nature.

Economic benefits: Through the implementation of the ecological restoration project, the problem of drinking water safety in local rural areas can be solved, the safety of people's lives and properties can be effectively protected, and the income level of the local people can be improved. It can reduce drought and flood disasters, effectively protect the ecological environment, and provide good conditions for the sustainable development of regional economy and society, and the economic benefits will be very significant.

Through the comprehensive improvement of land consolidation and goaf subsidence, the fragmented land can be concentrated into pieces, the productivity of farmland has been significantly improved, the development of agricultural economy has been promoted, and the GDP growth has been significantly increased. At the same time, the comprehensive improvement of coal mining subsidence can effectively alleviate the pressure of regional cultivated land occupation and compensation balance and insufficient construction land.

Through the construction of the farmland forest net, the cultivated land protected by the farmland forest net will increase by 10-30% compared with the crop yield without the forest net protection under the same conditions. Accelerating the cultivation of artificial forests, and gradually establishing a fast-growing and high-yield timber forest base dominated by poplars, can give full play to the economic benefits of the forest. Through the implementation of the ecological restoration project, the development of ecological agriculture, fish farming and ecological tourism will be promoted, which can generate huge economic benefits.

Strengthen the protection and restoration of geological relics, geological parks and wetland parks, build Taishan World Geopark, Dongping Lake and other wetland parks, better protect geological relics, enhance park science publicity, and promote the development of eco-tourism. The scale and grade will be further improved, and the number of tourism practitioners will be greatly increased, becoming a new growth point and pillar industry of the regional economy. Tourism-related income has increased, effectively improving the quality of life of community residents. At the same time, it provides a large number of employment opportunities, promotes local economic development, and realizes the rapid prosperity of community residents.

Social benefits: Restoring the damaged mine geological environment through ecological restoration projects, improving local disaster prevention and mitigation capabilities, is conducive to the social stability of the Taishan ecological area, alleviating the harm of the deterioration of the geological environment of the Taishan ecological area to the lives and properties of the local people, and further safeguarding the society stability and unity. Implement water pollution prevention and water body compliance projects, effectively control urban black and odorous water bodies, effectively protect groundwater, and gradually improve the water ecological environment. Through the implementation of

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ecological restoration projects, various high-standard geoparks, wetland parks, forest parks and other tourist parks will be built to provide people with activity space for ecological tourism, which is of great significance to scientific research, popular science, education, and cultural exchanges. In the process of natural ecotourism, people will integrate into nature, get close to nature, accept the personal experience of ecological civilization, get education and nurture, and enhance the environmental protection awareness of tourists and local residents. At the same time, it is also conducive to increasing employment opportunities and promoting local economic and social development.

6. Conclusion

The pilot area of the ecological protection and restoration project of mountain, water, forest, field and Lake in Taishan is a key area related to the sustainable development of the Chinese nation, an important ecological guarantee of the North China Plain, and one of the core areas affecting the national ecological security pattern. The implementation of ecological protection and restoration of mountains, rivers, forests, fields and lakes in the northern region provides a "Taishan experience" that can be used for reference, copied and promoted to further promote the continuous improvement of ecological and environmental conditions and make greater contribution to the construction of a beautiful China.

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