Design of Ecological Restoration Planning for Land Space under the Background of Ecological Civilization Construction

Guowei Liu; Yi Cao*

China Institute of Geo-Environment Monitoring, Beijing 100081, China

*corresponding author: caoyi202306@163.com

Abstract. As a crucial aspect of ecological civilization construction, ecological restoration of land space aims to achieve ecological environment restoration, biodiversity conservation, and sustainable land resource utilization through various means. To promote ecological restoration in a scientific manner, timely research on top-level design for land space planning is required. This includes clarifying overall restoration goals and principles, developing specific restoration plans and indicator systems, improving funding mechanisms and management measures, innovating ecological restoration technologies and methods, establishing cooperative mechanisms involving diverse stakeholders, establishing monitoring and evaluation systems to assess restoration progress and effectiveness, and enhancing legal regulations and policy support systems. These efforts will provide support for the scientific formulation of ecological restoration plans for land space, promote regional sustainable development and ecological environment protection, and contribute to the achievement of ecological civilization construction goals.

Keywords: Ecological civilization construction, land space, ecological restoration, planning, top-level design.

1 Introduction

To ensure the scientific and guiding nature of ecological restoration in land space, it is necessary to develop a top-level design for spatial ecological restoration planning in a timely manner. This design should clarify restoration goals and principles, establish specific restoration plans and indicator systems, promote funding security and management, innovate the application of technologies and methods, explore collaborative mechanisms involving diverse stakeholders, establish comprehensive monitoring and evaluation systems, and enhance legal regulations and policy support systems [1-5]. By comprehensively considering these elements, the objectives of ecological restoration in land space can be achieved in an orderly manner, promoting sustainable development and protecting the ecological environment, thereby providing an effective pathway for advancing ecological civilization construction [6-12].

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2 Restoration Goals and Principles

The top-level design of ecological restoration planning in land space should be centered around clear restoration goals and principles. Specifically, restoration goals include restoring vegetation coverage, soil quality, and water quality in affected areas, rebuilding ecological functions and ecosystem stability, and promoting local and regional biodiversity conservation. To ensure the scientific and guiding nature of restoration work, a set of restoration principles should be formulated [13-16]. The principle of prevention prioritizes taking preventive measures during human activities to reduce environmental damage. The principle of source control emphasizes controlling and reducing adverse impacts on the ecological environment at the source. The principle of ecosystem restoration prioritizes the restoration and reconstruction of damaged ecosystems to promote the recovery of ecological functions and the rebuilding of ecological processes, thus achieving comprehensive benefits in ecological restoration in land space [16-21]. In the top-level design of ecological restoration planning in land space, based on comprehensive scientific research and empirical data, establishing restoration goals and principles enhances the scientific and feasibility aspects of restoration work, emphasizes the guiding and directional nature of restoration work, and ensures its consistency and standardization [22-25]. This top-level design not only provides a scientific basis for advancing ecological restoration in land space but also serves as a guide for promoting ecological civilization construction in land space [25-23].

3 Restoration Planning and Indicators

The top-level design of land spatial ecological restoration planning needs to be supported by specific restoration plans and indicators. In formulating the plans, firstly, it is important to define the boundaries of the restoration areas, considering the specific types, scales, and ecological characteristics of different geographic units to ensure targeted and adaptive planning. Secondly, the restoration pathways and steps of the ecosystems should be clearly defined, and appropriate restoration measures and implementation strategies should be determined to ensure that the restoration work is systematic and continuous[24-32].

Regarding the development of indicator systems, a comprehensive and systematic set of indicators should be constructed, covering key indicators such as ecological environmental quality, vegetation recovery rate, water quality, and other relevant aspects. These indicators serve as the basis for assessing and monitoring the effectiveness of restoration efforts, providing scientifically feasible means to quantify and evaluate the outcomes of restoration work. Through regular monitoring and evaluation, the progress of restoration can be timely understood, issues can be identified, and corresponding measures can be taken to make adjustments, ensuring the effectiveness and sustainability of restoration work. The clarity of the plans and the comprehensiveness of the indicator system will help standardize restoration efforts, improve efficiency, and provide decision-makers and relevant stakeholders with objective and accurate evaluation data. Therefore, the development of restoration plans and indicator systems is a key element in the top-level design of land spatial ecological restoration planning and holds significant importance in achieving restoration goals and ensuring ecological civilization construction.

4 Funding Assurance and Management

The top-level design of land spatial ecological restoration planning not only requires the establishment of a comprehensive funding assurance and management mechanism but also the formulation of a series of effective measures at the policy and practical levels to ensure the sustainability of funding supply and the rationality of fund utilization. In terms of funding assurance, the top-level design should rely on diverse channels such as the government, enterprises, and public welfare funds to build a stable funding assurance mechanism. Government investment can be strengthened through fiscal appropriations and special funds to inject funds and assume the public responsibility for ecological restoration. Corporate investment emphasizes the corporate responsibility for ecological restoration and provides financial support, promoting the sustainable development of enterprises and fulfilling their ecological responsibilities. Public welfare funds provide additional financial support for land spatial ecological restoration to address potential funding gaps.

Regarding funding management, strict funding management measures should be established to ensure the rational allocation and effective utilization of funds. Among them, the key step is to formulate detailed funding management systems and standardized procedures to ensure the transparency, standardization, and efficiency of fund utilization. Clear funding allocation criteria and priorities should be established, guided by the principle of restoration priority, to ensure that funds are allocated reasonably according to restoration needs and priorities, maximizing the effectiveness of restoration work and resource utilization efficiency. Strengthening supervision and auditing of fund utilization to ensure compliance, effectiveness, and efficiency in fund usage provides decision-makers with scientific evidence and reasonable guidance.

By establishing a comprehensive funding assurance mechanism and effective funding management measures, the issues of funding scarcity and irrational utilization can be addressed, maximizing the effectiveness and sustainability of land spatial ecological restoration work. This is of significant importance in achieving restoration goals and promoting ecological civilization construction.

5 Innovative Technologies and Methods

In the context of ecological civilization construction, the top-level design of land spatial ecological restoration planning must actively promote the research, development, and application of innovative technologies and methods to facilitate the efficient restoration and recovery of land spatial ecosystems. Firstly, through the adoption of improved soil amendments, microbial remediation agents, and bioremediation agents, measures can be taken to improve the physical, chemical, and biological properties of regional soils, enhance soil quality and fertility, promote plant growth and root development, and achieve soil restoration and remediation. Secondly, by selecting plant species adapted to regional environments and utilizing their tolerance, enrichment, and remediation capabilities, the restoration and reconstruction of regional vegetation can be realized. These plant species can remediate soil pollutants, suppress soil erosion, improve water cycle, and provide habitats, thereby promoting ecosystem recovery and biodiversity restoration. Additionally, through the implementation of various approaches such as physical, chemical, and biological methods, regional wastewater, acidified water, and heavy metal-contaminated water can be treated and managed to reduce pollutant concentrations, restore water quality, and improve the health of water ecosystems. These techniques include sedimentation, adsorption, bioabsorption, and ecological restoration, which effectively purify water bodies and promote the sustainable utilization of water resources. Furthermore, by strengthening the close collaboration between scientific research and engineering practice, the conversion and application of technological research and development achievements can be advanced, continuously enhancing the efficiency and effectiveness of land spatial ecological restoration work. The establishment of a cooperative mechanism among research institutions, engineering practitioners, and government departments fosters knowledge exchange, technology sharing, and collaborative research, enabling the organic integration of scientific and technological innovations into the practice of land spatial ecological restoration, thereby driving the progress and sustainable development of land spatial ecological restoration endeavors.

6 Synergy and Collaboration among Diverse Stakeholders

In order to facilitate the smooth progress of land spatial ecological restoration work, it is essential to establish a mechanism that involves the participation of diverse stakeholders. This mechanism includes the active engagement of government, businesses, research institutions, social organizations, and the public, and it is formed through strengthened information sharing, technical exchanges, and collaboration.

Government departments are responsible for not only developing clear policies and regulations but also providing financial support and policy guidance. They establish relevant management institutions and oversight systems to ensure the scientific, compliant, and sustainable implementation of land spatial ecological restoration work. The government should also take the lead in the establishment of information sharing platforms to promote communication and cooperation among all stakeholders. Enterprises are not only involved in the formulation and implementation of restoration plans but also in the development and enforcement of strict environmental protection measures. Their goal is to minimize the impact on the ecological environment during regional development processes. Additionally, enterprises should enhance technological research and innovation to advance and apply land spatial ecological restoration technologies. Research institutions engage in scientific research related to land spatial ecological restoration, providing scientific evidence and technical support for restoration work. They drive innovation and application of restoration technologies and methods. Research institutions should also establish close collaborations with the government and enterprises, strengthening technical exchanges and cooperative project development. Social organizations play a crucial role in promoting public participation in land spatial ecological restoration work. They do so through environmental education, advocacy activities, and public opinion monitoring, aiming to guide public awareness and involvement in environmental protection. Social organizations can also provide professional opinions and recommendations to facilitate cooperation and communication among the government, enterprises, and research institutions.

In conclusion, establishing a mechanism involving the participation of diverse stakeholders in land spatial ecological restoration is of utmost importance. Through the active engagement of government, businesses, research institutions, social organizations, and the public, along with strengthened information sharing, technical exchanges, and collaboration, synergistic efforts can be formed to facilitate the smooth progress of land spatial ecological restoration work.

7 Investigation, Monitoring, and Assessment

Establishing a comprehensive monitoring and assessment system is crucial in the planning of land spatial ecological restoration. This system should cover various aspects, including ecological environment monitoring, vegetation restoration assessment, and water quality evaluation. It aims to regularly monitor and evaluate indicators such as the ecological environment, vegetation restoration, and water quality in the restoration areas, ensuring an accurate assessment of the restoration effectiveness.

Firstly, it is important to establish a systematic ecological environment monitoring system to continuously monitor factors such as soil quality, water quality, and climate factors in the restoration areas. This provides a comprehensive understanding of the ecological environment status and its changing trends in the restoration areas. Strengthening biodiversity monitoring allows for quantitative and qualitative assessments of biodiversity in the restoration areas, evaluating the complexity and stability of the ecosystem. Secondly, through systematic surveys and assessments, the vegetation coverage, species diversity, and plant growth conditions in the restoration areas should be monitored to evaluate the effectiveness and achievements of vegetation restoration. Monitoring the physiological and ecological characteristics of plant growth provides a comprehensive understanding of the health status of the plant communities in the restoration areas. Furthermore, water quality evaluation is also an indispensable component. Establishing a water quality monitoring system allows for regular monitoring and assessment of the water quality in the restoration areas. By evaluating water quality, potential water environmental issues can be timely identified and appropriate measures can be taken. By regularly monitoring indicators related to the ecological environment, vegetation restoration, and water quality in the restoration areas, it is possible to accurately assess the effectiveness of the restoration efforts. Based on the assessment results, necessary adjustments and improvements can be made to ensure the scientific, effective, and sustainable implementation of the restoration work.

8 Conclusion

To effectively promote land spatial ecological restoration, it is necessary to conduct timely top-level design for ecological restoration planning, clarify restoration goals and principles, and establish overall objectives and restoration principles to guide the work. Specific restoration plans and indicator systems are indispensable, determining restoration areas, pathways, and measures based on the characteristics of different ecological geographic units, and establishing a comprehensive assessment indicator system. Funding assurance and management are key to ensuring the continuous progress of restoration work, requiring the establishment of robust funding assurance mechanisms and management measures. The application of innovative technologies and methods can enhance restoration effectiveness, while the participation of multiple stakeholders and cooperative mechanisms contributes to synergistically advancing restoration work. Establishing a monitoring and assessment system enables timely understanding of restoration progress and allows for necessary adjustments and improvements. A sound regulatory and policy support system provides legal basis and policy support for restoration work. By considering these elements comprehensively, the development of a scientific, systematic, and feasible top-level design for land spatial ecological restoration planning is crucial to achieving the goals of land spatial ecological restoration and the construction of ecological civilization.

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