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Construction of a Semi-Arid Steppe Ecological Network and a Case Study of a Mining City

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Introduction

Surface coal mining results in a slew of landscape ecological disruptions and environmental issues. Maintaining ecological balance, safeguarding biodiversity, avoiding pollutant spread, and improving landscape connectedness are all key functions of the landscape ecological network. Previous research on the landscape ecological network of mining cities, on the other hand, has not taken into account the influence of mining on landscape ecology. This study suggested a paradigm for constructing landscape ecological networks to mitigate the effects of surface coal mining on landscape ecology [1]. By developing a resistance surface based on multi-regulation integration, the minimal cumulative resistance model was applied to mimic the landscape ecological network. The newly developed landscape ecological network aids in enhancing the landscape function of mining sites, avoiding mining effect, and self-restoration of the landscape. Mining communities originate as a result of the extraction and processing of mineral resources, and mineral resources have long held the top industrial position. The tension between human, land, and ecological environment is particularly severe in mining cities of the semi-arid steppe, which serve as regional political, economic, industrial, and cultural hubs and high-density population regions [2-4].

As a result, it is critical to successfully optimise the landscape pattern, which involves achieving the highest overall recovery with the least amount of physical intervention and fully comprehending the landscape ecological problems as well as the complexity of the impact of mining on the landscape. Building a Landscape Ecological Network (LEN) is a good technique to improve the landscape pattern. Despite the fact that it does not cover a big area, LEN has a significant role in landscape function. A linear element network (LEN) is a land network made up of linear elements. LEN is created, built, and maintained to serve a variety of functions. LEN serves a variety of purposes, including environmental protection, ecological function enhancement, pollution control, recreation, aesthetics, and culture, among others. In the coal-based metropolis, the ecological design of "two horizontal, four vertical, and four Circles" was built using the Minimum Cumulative Resistance (MCR) concept. Based on the landscape ecological risk assessment, Wanxia Xu. constructed a LEN of a large-scale opencast coal mine area by using the MCR model. In a resource-based metropolis, Xia Wu. built ecological corridors using the MCR model. Petr Sklenicka and Eva Charvatova provided a strategy for selecting the most useful areas of the landscape for the ecological network of Petr Sklenicka and Eva Charvatova. Peter Wirth proposes and defines a method that integrates green infrastructure with particular conceptions of post-mining landscapes in the broad post-mining context of China and Germany. Martina Artmann . linked green infrastructure to grey infrastructure, such as former mineral extraction regions, to create a landscape planning guideline that promotes compact, green towns. The principle was tested using the landscape layout of Dresden, Germany, which includes a mining city within an LEN.

Conclusion

A framework for LEN building to manage surface coal mining's influence on landscape ecology was provided in this study. The landscape pattern optimization model "One-ring, Two-vertical, Two-horizontal, Eight-core, Ten-node, and Multi-corridor" was built based on the newly produced "source" landscape, ecological corridor, ecological node, and constructed wetland [5]. In reality, the landscape pattern optimization model developed in this work is based on the landscape ecology of mining cities' intrinsic repair capabilities as well as the influence of mining on landscape ecology. Construction of a prospective LEN can aid mining city self-restoration, and the damaged landscape ecology can proceed towards a benign cycle and heal on its own through active feedback. This research might lead to new concepts and approaches for optimising landscape patterns, landscape ecological planning, urban planning, and ecological restoration in semi-arid steppe mining sites.

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Conflict of Interest

The authors declare that they are no conflict of interest.

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