

A systematic review and meta-analysis on ecological restoration of mining areas in the arid region of China: challenge, capability and reconsideration

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Abstract

The arid region in China with rich mineral resources are belongs to ecological fragile region with inadequate recovering capacity. Hundred years of continues mining of mineral resources for economic purposes, leads to the problem of land degradation caused by the spatial coupling of large-scale mining disturbance and arid fragile ecological environment. The environmental problems created by mining have not been addressed promptly, while at the same time, new problems have emerged. On the basis of our 20 years of practical experience on ecological restoration in mining areas, review and synthesis of selective literature, with interpretation and perspective, the mining situation and its ecological impacts, the factors impeding ecological restoration capability in the arid region in China were examined, the key challenges and promotion strategy were presented. The main findings of this study are as follows: Land degradation is the most prominent problem resulting in mining activities, and mainly reflected by immediate disturbance, long term effects and ecological degradation. The main challenges faced by mining area restoration in arid areas are unclear objectives of ecological restoration, lack of ecological water consumption, unreasonable selection of indigenous plants, serious land degradation and wide restoration area. Our restoration experiments in typical mining areas have proved that the micro-topography reconstruction measures can increase surface roughness, redistribute limited precipitation resources (especially snow), and make soil water and nutrients carried by surface runoff and collected in valleys to regulate soil infiltration and water supply, so as to achieve water-saving and non-irrigated vegetation restoration .The ideal restoration effects are the mitigation of geological hazards, the increase of available land resources, and the improvement of ecosystem services in mining areas. This study would be helpful to carried out related implementation on ecological restoration and could act as a valuable reference for the researchers involved in the ecological restoration.in arid region.

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