Ecological restoration stimulates environmental outcomes but exacerbates water shortage in the Loess Plateau

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Abstract

Restoration is the natural and intervention-assisted set of processes designed to promote and facilitate the recovery of an ecosystem that has been degraded, damaged, or destroyed. Therefore, the need to assess an ecological restoration project is a critical step to evaluate its success and identify best management practices. We performed a meta-analysis concerning the environmental outcomes during the years 2000 to 2015 resulting from the "Grain for Green" Project (GFGP) implementation in the Loess Plateau (LP). Data were collected in 48 English-language peer-reviewed papers selected from a pool of 332 papers. The results showed that, on average, GFGP increased forest coverage by 35.7% (95% CI: 24.15-47.52%), and grassland by 1.05% (95% CI: 0.8-1.28%). At the same time, GFGP has a positive impact on soil carbon (C) sequestration, net ecosystem production (NEP), and net primary production (NPP), from the years 2000 to 2015 by an average of 36% (95% CI: 28.96-43.18%), 22.7% (95% CI: 9.10-36.79%), and 13.5% (95% CI: 9.44-17.354%), respectively. Soil erosion, sediment load, runoff coefficient and water yield reduced by 13.3% (95% CI: 0.27%-25.76), 21.5% (95% CI: 1.50-39.99%), 22.4% (95% CI: 5.28-40.45%) and 43.3% (95% CI: 27.03%-82.86%), respectively, from the years 2000 to 2015. Our results indicate that water supply decreased with restoration age. Therefore, GFGP policies and strategies should be adjusted to balance the need for green space and grain trade by recovering, enhancing, and maintaining more resilient landscapes.

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1. Ngaba et al. 2021.doc available at https://authorea.com/users/449557/articles/548068-ecological-restoration-stimulates-environmental-outcomes-but-exacerbates-water-shortage-in-the-loess-plateau