

# High-quality and sustainable development of soil and water conservation vegetation in a water-limited region

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January 30, 2024

## Abstract

In the water-limited regions, there is a limit of vegetation restoration because the short of soil water and people's big need. However, there are few reports on the limit of vegetation restoration. In this study, non-native perennial Caragana shrublands was selected to establish experimental plots with different densities, and cover degree, basal diameter and plant height growth, soil water and precipitation was investigated, soil water supply and soil water consumption at different planting density was estimated and the relationships between planting density and soil water, soil water carrying capacity for vegetation and the potential for vegetation rehabilitation was analyzed. The results showed that the degree of cover increases with increasing density under other things being equal; the canopy interception increases with stand density and both of them is an exponential relation; the surface runoff decreases with increasing density and the relationship between them is a logarithm relationship; the sediment charge in the runoff increases with reducing density and the relationship between them can be expressed by a logistic equation. Although the canopy closure increases and the effect of the caragana forest on soil and water conservation strengthens with increasing density, but there is a limit of vegetation rehabilitation. When the cover degree of Caragana shrublands is more than the vegetation restoration limit, the water-plant relationship should be regulated based on soil water carrying capacity for vegetation to control soil drying and realize high-quality and sustainable development of soil and water conservation vegetation.

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