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Editorial: Structure and function of vegetation during ecological restoration of degraded land

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Editorial on the Research Topic
Structure and function of vegetation during ecological restoration of degraded land

Land degradation caused by environmental change and anthropic activities seriously restricted the health and function of ecosystems, leading to a decline in land productivity. Suppressing land degradation and restoring degraded land is an urgent Research Topic for protecting biodiversity and ecosystem services. The intuitive manifestation of degraded land is the change of vegetation, including reduced plant productivity and diversity, which can affect ecological functions such as biodiversity, carbon storage and nutrient cycling (Rey, et al., 2011; Hu et al., 2016; Huang et al., 2020; Wu et al., 2020). Research is needed on characterizing plant responses to land degradation and vegetation restoration, to restore ecosystem function and improve sustainable land management (Ghosh et al., 2021). In this Research Topic, researchers studied the responses of vegetation to environmental change and anthropic activities during restoration of different ecosystems. It contains 5 papers that proposed effective restoration processes and/or strategies for degradation land.

In semi-arid grassland ecosystems, water and salinity are driving factors of environmental changes on vegetation succession. The trampling and mowing effects caused by grazing that the most frequent human disturbance. Liu et al.investigated the response of annual plant seedlings emergence to precipitation variation and trampling disturbances. An increase in precipitation significantly improved total seedling emergence and the effect varied with trampling intensity. Precipitation changes and trampling disturbances altered the functional composition of species and seedlings of grasses and forbs. Light and moderate trampling with increased precipitation could promote the emergence of grass seedlings, and no trampling with increased precipitation could improve the seedling emergence of forbs. These findings suggested that targeted grazing management measures should be implemented for plant communities dominated by grasses or forbs under the background of precipitation change, thus promoting the vegetation restoration in semi-arid grasslands. The study of Qu et al.was performed in the Songnen grassland of northeast China, which is a typical saline-alkaline grassland in semi-arid areas. Soil salinity is heterogeneous and diverse in the natural soil environment. Grazing exacerbated the salinity heterogeneity of soil habitats, leading to the formation of

multiple adaptation strategies of dominant clonal plant species. The research found that mowing significantly reduced the average plant height and aboveground biomass of Homogeneous patches. Heavy mowing had significant adverse effects on plant underground (rhizome, fine root) biomass and leaf area. In saline-alkali heterogeneous environments, *Leymus chinensis* can cope with grazing or mowing disturbances by increasing the number of tillers and seeds.

In different stages of grassland restoration, actively balancing the ecological and production functions of grassland can help to obtain the best restoration effect, and plant community construction in the region is mainly an ecological niche restoration process. To a certain extent, this explains the difference in species replacement and richness between communities in each restoration stage. The changes in plant characteristics at each stage of restoration also confirmed those changes, and further provided a possible basis for changes in diversity-productivity relations. The study of Dou et al. shows that the ecological and production functions of grasslands, the status of vegetation in each region, and the intensity and mode of grassland use should be fully considered in the restoration strategy of temperate savannah, so as to promote the effective restoration of vegetation. As for how plant feedback is affected by the ecosystem of alpine meadow grassland, She et al.found that during the succession of alpine meadow degradation, the aboveground biomass and species diversity index showed a downward trend with the deepening of degradation. The aboveground biomass decreased with the increase in recovery years, and the species diversity index changed in a "V" shape. As the recovery years increase, the feedback direction changes to negative feedback, and by 10 years of recovery, the feedback is negative. During degradation, ecosystem versatility changes from positive feedback to negative feedback. This will shed light on the restoration of degraded alpine meadows.

Due to the vigorous development of agriculture in previous years, the area of peatlands is declining sharply. It is necessary to develop the technologies to protect these unique ecosystems. Wang et al.studied the effect of topsoil removal on vegetation restoration of silt and sediment-improved peatlands in the Changbai Mountain, and found that topsoil removal could effectively improve the soil nutrient level and water holding capacity of silt-improved peatlands, and also that topsoil removal affected the restoration of peatlands by changing the soil environment and soil seed bank conditions, leading to success in vegetation restoration of silt-improved peatlands. The addition of substances with a fine texture effectively protects the deep peat from aerobic environments and retains the seed under favorable storage conditions in the peatlands. When topsoil material is removed, peatland species can be regenerated through soil seed banks. Therefore, topsoil removal was found to be an effective method for silt to improve vegetation restoration in peatlands.

In summary, the 5 papers in this Research Topic provided vegetation restoration strategies in degraded grassland or peatland ecosystems. Such work is necessary to balance natural environmental changes and anthropic activities. Moderate human intervention has been shown to promote ecosystem restoration.

Author contributions

XL and JC: Concentualization, Writing-original draft. JW: Writing-review and editing. All authors listed have made a substantial, direct, and intellectual contribution to the work and approved it for publication.

Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Publisher's note

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