

순일차생산성과 물이용효율을 이용한 동북아시아 건조지의 토지황폐화 및 회복 평가

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Assessing the Degree of Land Degradation and Rehabilitation in the Northeast Asia Dryland Region (NADR) using Net Primary Productivity (NPP) and Water Use Efficiency (WUE)

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Changes in vegetation productivity and species composition have been used as conventional indicators of land degradation and rehabilitation assessments. The two biophysical parameters vary nonlinearly during land change process with various time lags, which provide, as a whole, a useful framework to diagnose degree of land degradation and rehabilitation. In this study, the net primary productivity (NPP) and water use efficiency (WUE), which are the proxies of vegetation productivity and eco-physiological properties related to species composition, were combined to develop an eco-physiological framework to assess the degree of land degradation in the Northeast-Asia dryland regions (NADR) from 1982 to 2012. Results from long-term trends analysis showed slight, moderate or severe degradation occurred in northern grassland and central barren or sparsely vegetated regions, respectively, while the rehabilitation prevailed in eastern croplands and forest, southern and western grassland. In contrast, short-term trend analysis illustrated the recent rehabilitation in mid-eastern Mongolia and Loess Plateau, which was unseen in long-term trend analysis. The spatial patterns and temporal changes of land degradation and rehabilitation could be explained partly by either or both natural and anthropogenic factors. Long-term drying and warming might induce land degradation in northern and central NADR, respectively, while the recovery projects and wetting conditions after 2000s promoted the land rehabilitation in Loess Plateau and mid-eastern Mongolia. Here, our NPP - WUE framework may contribute further conceptual development and rapid assessments on land degradation and rehabilitation in wide geographic regions.

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