Correlation between landscape pattern and net primary productivity in arid and semi-arid areas of Northwest China

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Abstract

Human activities and environmental changes have affected the changes of landscape pattern, and then profoundly affected the changes of net primary productivity (NPP) of vegetation. Understanding the relationship between landscape pattern and NPP is of great significance for maintaining the stability of ecosystem and improving ecological environment. Based on six types of land use in arid and semi-arid areas of northwest China, this study selected five landscape pattern indexes at the landscape level and four landscape pattern indexes at the class level, and analyzed the relationship between landscape indexes and NPP at the grid scale of 100km×100km by Pearson correlation and multiple linear regression model. The results showed that the landscape pattern index and NPP showed different degrees of correlation from 2001 to 2020, and changed in different degrees in the past 20 years. The correlation between indicators and NPP is higher at class level than at landscape level, and the increase of landscape abundance and fragmentation promotes the increase of NPP. At the landscape level, NP, PR and SHDI explained 45.4% of NPP changes. At the class level, NP, TE and IJI were the main influencing factors of NPP in cultivated land, woodland and grassland. The correlation between landscape index and NPP and multiple linear regression model can help us to quantitatively understand how the change of landscape pattern affects the change of NPP, and we should properly consider the change of landscape pattern in ecological management, so as to maintain the stability of the ecosystem.

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