

Exploring influences of human activities and natural factors on NDVI changes in the upper reaches of Minjiang River, China

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Abstract

Quantifying the influences of factors on Normalized Difference Vegetation Index (NDVI) changes is critical to understanding the functions of terrestrial ecosystems. However, identification of the causes responsible for vegetation changes is still limited. We applied the Geographic Detector to quantify the individual and interactive influences of human and natural factors on the change in the vegetation NDVI, and determined the optimal characteristics of factors that are beneficial to vegetation growth. Our results show that vegetation cover for 2000 and 2015 is in good condition, and regions with $NDVI > 0.6$ showed a significant transformation, whereas areas with mid-high vegetation or lower and areas with high vegetation increased and decreased, respectively. Vegetation cover changes were mainly in the upper reaches of the Minjiang River and its tributaries. We illustrated that the elevation, annual average temperature, and soil type can satisfactorily account for the vegetation changes with explanatory powers of 60%, 52% and 39% or larger, respectively. Land use types and distance from the road had enhanced influences in the NDVI changes with explanatory powers of less than 16% and 12%, respectively. We proposed that there are interactive effects between the impact factors on vegetation NDVI, and the synergistic effects of the impact factors showed mutual enhancement and nonlinear enhancement. The interaction between the two factors strengthens the influence of each individual factor on the vegetation changes. This study provides important references that policymakers can use to intervene and promote vegetation change for ecological protection and vegetation restoration, while alleviating environmental degradation.

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Figures

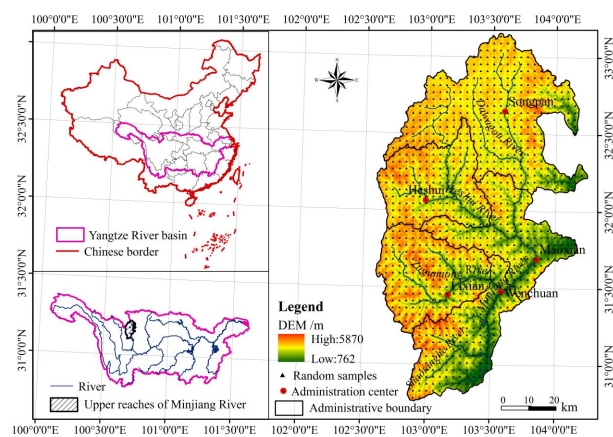


Fig.1. Location of study area