

Land Use/Land Cover Changes and Regional Climate over the Loess Plateau during 2001–2009. Part I: Observational Evidence

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Abstract

Adverse environmental impacts from deforestation are a growing area of concern in climate change discussions. The Chinese government has implemented a series of policies, such as the Grain for Green Project, in an attempt to mitigate the impacts. This study takes a regional perspective to report land use/land cover changes over the Loess Plateau region from 2001 to 2009. MODIS data were used in analyzing both the conversions among and the resulting changes in different land types. Government statistical census data and observed climate data were also incorporated in the analysis. A general consistency is shown in both remotely sensed and census data. With the implementation of various projects, including the Grain for Green Project, the total areas covered by grassland, cropland, and forests have increased by 19.2% ($6.05 \times 10^4 \text{ km}^2$), 33.7% ($5.80 \times 10^4 \text{ km}^2$), and 19.6% ($3.08 \times 10^4 \text{ km}^2$), respectively, during the nine-year period. While climatic conditions, particularly annual precipitation totals, usually dominate the distribution of vegetation, it is found that socioeconomic policies and human activities contribute to the increase in overall greenness and to vegetation growth (e.g., LAI increased by 16.8% (0.10) overall). However, the feedback of land use/land cover to regional climate is complicated and cannot be easily distinguished from natural climate variations based on short-term observational data alone. To better isolate the effects, further analysis and modeling studies are suggested.

Key Words: *Afforestation; Land use land cover; Loess Plateau; Regional climate; Grain for Green Project*