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PROCEEDINGS

Land Use and Carbon Emission Intensity in China: A Data Analysis of Spatio-Temporal Disparities and Spatial Agglomeration

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ABSTRACT

This study addresses the critical issue of spatio-temporal disparities in carbon emission intensity (CEI) across different land use types in China, a pressing concern given the nation's 'Dual Carbon' goals and the global urgency to mitigate climate change. Understanding how land use influences CEI is vital for designing region-specific carbon reduction policies and advancing sustainable land management practices. Previous research lacked a comprehensive integration of spatial and temporal dimensions, focusing on isolated case studies or failing to compare provincial-level dynamics. This study analyzes the long-term evolution of CEI from 2009 to 2022 across 30 provinces, incorporating both carbon sources and sinks linked to land use types, and examining spatial interdependencies often overlooked in earlier studies. This study calculates carbon emissions and sinks using the emission factor method. The decoupling index quantifies the relationship between economic growth and CEI. Moran's I index assesses spatial autocorrelation and agglomeration effects among provinces. Findings reveal that while China's overall CEI declined significantly from 2009 to 2022, pronounced regional disparities persist. Southern and eastern provinces exhibit lower CEI, forming low-low (LL) spatial clusters, whereas northern and western regions, dominated by energy-intensive industries, show high-high (HH) agglomeration. The decoupling analysis indicates weak decoupling between economic growth and land use carbon emissions in most years, suggesting partial but incomplete decoupling. Policymakers should adopt differentiated strategies. HH regions should prioritize industrial restructuring and strict land use control, while LL regions can foster low-carbon clusters and regional cooperation. Future research can integrate higher-resolution data, and simulate policy scenarios.

KEYWORDS

Carbon emission intensity; land use; decoupling index; Moran's I index; data analysis

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