A Review of the Interactive Stress Effects between Urbanization and Ecological Environment in the Kashgar Urban Agglomeration: Postprint

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Abstract

Research findings on urban agglomerations have played a leading role in shaping the overall pattern of China' s urban agglomerations and have made important contributions to the development of China' s new-type urbanization. This paper focuses on the Kashgar urban circle located at the junction of the Silk Road Economic Belt. Based on the CiteSpace bibliometric method and using data from Chinese core journals as well as the EI and Web of Science core collections, this study summarizes domestic and international research findings on the interactive stress effects between urbanization development and ecological environment in the Kashgar urban circle through the analysis of core keywords, research hotspots, research institutions, and research teams. It is believed that current research on the Kashgar urban circle is very weak, mainly reflected in the concentration of research focuses on exploring the relationship between urbanization and ecological environment. Existing studies have preliminarily revealed the stress effects of urban circle urbanization on single elements of water resources and land resources from three dimensions: urban population agglomeration, urban economic growth, and urban spatial expansion; and have deeply investigated the limiting effects of the urban circle' s ecological environment on urbanization from the perspective of single elements such as water resources, land resources, and atmospheric environment. Future efforts need to strengthen research on and construction of the Kashgar urban circle, orient research by national strategic needs, and continue to deepen investigations into the interactive stress effects of resources and environment during the formation and development of urban circles.

Full Text

Preamble

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Abstract: Research on urban agglomerations plays a leading role in shaping China' s overall urbanization patterns and contributes significantly to the development of new urbanization strategies. This study tracks research on the urbanization development of Kashgar metropolitan in Xinjiang, China, a city located at a strategic junction on the Silk Road Belt. Using bibliometric data from CSCD, EI, and Web of Science, we analyze research on the reciprocal coercing effects between urbanization and eco-environment in Kashgar metropolitan through CiteSpace bibliometric methods, examining keywords, research hotspots, institutions, and research groups. Our analysis reveals that research on Kashgar metropolitan development remains limited, with most studies focusing on the relationship between urbanization and eco-environment. Previous research has explored the coercing effects of urban agglomeration urbanization on individual elements such as water and land from perspectives of population concentration, economic development, and urban spatial expansion, as well as the constraints imposed by urban eco-environment on urbanization due to limited water, land, and atmospheric capacities. Future research should pay greater attention to the reciprocal coercing effects between urbanization and resources-environment in the formation and development process of Kashgar metropolitan.

Keywords: urbanization; eco-environment; reciprocal coercing effects; Kashgar metropolitan

2 Data and Methods

This study employs the bibliometric visualization software CiteSpace (Java-based) to analyze literature on urbanization and eco-environment in Kashgar metropolitan. Data were retrieved from CSCD, EI, and Web of Science databases using search terms including "Kashgar," "Kashgar City," "Kashgar region," "urbanization," and "eco-environment." The temporal scope covers 1949–2018, with analysis focusing on the period 1990–2018, yielding 480 relevant articles.

CiteSpace 5.0.R7 was utilized for analysis with the following parameters: time slice 1990–2018, top 50 most cited items per slice, and node types including

keyword, institution, and author. Keywords such as "urbanization," "eco-environment," and "land use" were selected for co-occurrence network analysis to identify research hotspots and evolutionary trends.

3 Results and Analysis

3.1 Keyword Co-occurrence Network Analysis

The keyword co-occurrence network reveals research hotspots and thematic evolution in Kashgar metropolitan studies. [Figure 1: see original paper] illustrates the keyword co-occurrence network, where nodes represent keywords and connections indicate co-occurrence relationships. summarizes the main research hotspots.

Key research themes include urbanization, land use change, water resources, eco-environment, and sustainable development. During 1980–1997, research focused on basic geographic and environmental characteristics, with keywords such as "land use"and "water resources"dominating. The period 1991–2003 saw increased attention to urban expansion and its environmental impacts, with "urbanization" and "eco-environment" emerging as central themes. Since 2004, research has shifted toward sustainable development and coordinated urban-ecosystem relationships, with keywords like "sustainable development" and "ecological sensitivity" gaining prominence.

The centrality and frequency of keywords indicate that urbanization and land use change constitute the core research frontier. The co-occurrence network density suggests strong interconnections between urbanization, water resources, and eco-environment, highlighting the complex interactions in this arid region.

3.2 Institutional Collaboration Network Analysis

The institutional collaboration network analysis identifies key research institutions and their cooperative relationships. [Figure 2: see original paper] displays the collaboration network, where nodes represent institutions and links denote collaborative publications.

The Xinjiang Institute of Ecology and Geography, Chinese Academy of Sciences, emerges as the primary research institution, demonstrating extensive collaboration with other domestic and international institutions. Collaborative clusters center on geographic information systems, remote sensing applications, and water resource management. [Figure 3: see original paper] presents a timeline view of institutional collaborations, showing that research intensity increased significantly after 2000, particularly following the implementation of national development strategies for western China.

The network analysis reveals that interdisciplinary collaboration between geography, ecology, and urban planning institutions has been crucial for advancing comprehensive understanding of urbanization-eco-environment interactions in

Kashgar metropolitan. However, international collaboration remains relatively limited, suggesting potential for enhanced global research partnerships.

Note: Figure translations are in progress. See original paper for figures.