The coupling relationship between urbanization and the eco-environment in urban agglomeration

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An urban agglomeration is a large, open, and complicated system encompassing the cross-couplings of internal and external elements. Of these, internal elements refer to all those factors that can improve urban socioeconomic development within the city, while external elements include all the imported factors from outside of the city that could promote socioeconomic activities. Following expansion of urban agglomeration and its increasing demands on resources, internal elements are gradually unable to fulfill the needs of sustainable development, resulting in continuous importation of large numbers of external elements and stresses on the agglomeration ecosystem.

In this paper, researchers have creatively established a framework of local couplings and telecouplings between urbanization and the eco-environment. On the basis of urban emergy analysis, this research studied the Beijing-Tianjin-Hebei urban agglomeration and investigated the metabolic efficiency of local couplings and telecouplings between urbanization and the eco-environment as well as corresponding environmental pressures in the last 35 years spanning the period between 1980 and 2014.

This research has expanded relationships from local coupling into the new field of telecouplings, which will provide new research ideas for our understanding of the relationships between humans and the planet in the future. In this study, researchers demonstrate that external elements replaced internal ones and became dominant in the metabolic structure of the Beijing-Tianjin-Hebei urban agglomeration. At the same time, researchers conclude that the drop in metabolic emergy intensity accelerated while environmental load increased.
This results thus provide quantitative reference points for decision-making in effectively controlling the growth of foreign populations, gradually alleviating the non-capital functions of Beijing, improving and adjusting economic structures, raising economic operational efficiencies, solving environmental pollution, and promoting the coordinated development of Beijing, Tianjin, and Hebei.


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