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Provincial Ecosystem Service Footprint and Spatial Flow in China

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Ecosystem service (ES) has deeply embedded in environmental decision-making. The flow of ecosystem services between different regions caused by the spatial mismatch of supply and consuming become an advanced research hotspot. Based on the data availability, this dissertation focuses on three representative ecosystem services: food provision, freshwater provision, and carbon sequestration. Ecosystem service footprint method was improved using Multi-Regional Input-Output Model (MRIO) to study the spatial flows of these three ecosystem services within the context of China's domestic trade and 15 sectors contribution embodied in provincial trade in 2002 and 2012. Factors such as social development and population growth put heavy pressure on ecosystems, and how ecosystem service flow effect the different regions are analyzed. Moreover, comprehensively analyze the relationship of three kinds of ecosystem services, and the spatial structure of the ecosystem service flow. Which expands the research field of ecosystem service, and provides a theoretical reference for the sustainable development for our country.

The main conclusions are as follows:

1. It shows obviously regional differences in ecosystem services footprint.

2. Combined with the carrying capacity of ecosystem services, lots provinces have caught into ecosystem service deficit. The results show that, on the one hand, with the development of economy, our country overdraw seriously for ecosystem services; on the other hand, the uneven distribution of supply and consumption of ecosystem service, that eastern region consume more than supply, which put much pressure than it could be taken.

3. Spatial unbalance of ecosystem service supply and demand is the fundamental cause of ecosystem service flow. The role of ecosystem services flow cannot ignored. For import region, embodied ecosystem services is a kind of external resources, which can reduce their local stress. While for the export area, if there already exists serious deficit, it will no doubt aggravate severe stress on the local ecosystem.

4. According to the STIRPAT model, we verify the three services footprint, and the results presents that the Kuznets curve does not exist, or the turning point has not yet improved. The food provision service which meeting the basic demand of sustained growth of economic, trades off the carbon sequestration service which absorbing the CO_2 emissions.

Based on the above conclusion, we put forward the following suggestions. Firstly, set ecosystem service footprint and the carrying capacity comparison as an indicator of ecological civilization. Secondly, strengthen ecosystem management, so that improve ecosystem service carrying capacity. Thirdly, take reducing the per capita ecosystem service footprint as a major means to reducing the deficit and achieving sustainable development goal. Fourthly, make sure we reasonable use the ecosystem service flow to balance the ecosystem services deficit. Finally, carry out a comprehensive payment for ecosystem service, and enhance the vitality and elasticity of ecosystem.