

The spatial flow of freshwater ecosystem services: A case study of Tumen River watershed

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Freshwater is widely regarded as the most essential natural resource underpinning the well-being of human society, and while scientists translate it into ecosystem services' valuable processes, the supply of clean freshwater has the highest value among various provisioning services. However, due to the land-use intensification and projected warming climate, an increasing likelihood of persistent drought condition, and inadequate conservation, freshwater scarcity issues continue to gain urgency in science and policies. The fusion of the concept of ecosystem services with natural resources management nowadays represents a new conservation paradigm, but still faces notable limitations. Some scientists, noticing the occurrence of spatial mismatch between the supply and demand of ecosystem services, put forward the concept of ecosystem services flow to deal with the problem. Ecosystem services flow research brings out a spatio-temporal connection between the supply and demand, and an deepened understanding about when ,where, and how those benefits were enjoyed. Many papers also suggested that studies at landscape scale may offer a better understanding of ecosystem processes, ecosystem functions, ecosystem services and link them from one to another, as landscape patterns have long been discussed as tools for explaining numerous ecological consequences. In 2017, the annual meeting of IALE in USA as well emphasized the pressing need of integrating landscape patterns to ecosystem services. Thus the study attempt to conduct an analysis of freshwater ecosystem services flow in an intact watershed with the combination of landscape ecology theories. The conceptual framework and progress of this study will be introduced.

Keywords: freshwater ecosystem services, services flow, andscape pattern, watershed