# Application of the DPSIR Model to Analyse Ecosystem Service Drivers of Agricultural Human-Environment Systems

YING HOU, MARION KANDZIORA, BENJAMIN BURKHARD, FELIX MÜLLER

*University of Kiel, Institute for Natural Resource Conservation, Germany*

## Abstract

Integrating environment and human systems, ecosystem services have been drawing an increasing concern from environmental researchers and managers. One research focus regarding ecosystem services is the dynamics and the drivers, since this issue can well reveal the impacts of social and economic systems on natural systems. However, due to the insufficiency of quantitative analysis of the interrelationships between ecosystem service changes and social-economic drivers, the exact reasons for ecosystem service dynamics are usually still unclear. The Driver-Pressure-State-Impact-Response (DPSIR) model is a promising tool to identify the interactions between the components of human-environment systems and describe the cause-effect processes. It has potentials to quantitatively analyse how ecosystem services change under the drivers of human systems.

Our research aims at identifying the drivers of ecological integrity/ecosystem services and human well-being in agricultural human-environment systems and demonstrating how these drivers play their roles. We proposed a framework coupling DPSIR, ecological integrity/ecosystem services as well as human well-being and put forward the DPSIR indicators for the case area: Jiangsu, China. Then we revealed the factors significantly impacting ecological integrity, ecosystem services and human well-being of the research area through correlation analysis, which took the 13 prefecture-level cities of Jiangsu as the sample. The results show that urbanisation, industrialisation and economic development are the predominant positive drivers of the regional biodiversity, food provisioning service and rural residents' living standards at the prefecture-level city scale. Additionally, the knowledge, technology and finance inputs for agriculture also have generally positive impact on these aspects. This phenomenon is probably due to the high intensity land use for regional economic development and human habitation, which can save land for more natural vegetation. Contrarily, the expanding of farming land and the increasing of agricultural economy are two important negative driving forces of biodiversity, ecosystem food provisioning capacity and the well-being of the rural populations. Our study provides a promising approach based on the DPSIR model to quantitatively capture the drivers of ecosystem services and human well-being for agricultural human-environment systems at the regional scale.

**Keywords:** DPSIR, driving force, dynamics, ecosystem services, human-environmental, quantify

**Contact Address:** Ying Hou, University of Kiel, Institute for Natural Resource Conservation, Olshausenstr. 75, 24118 Kiel, Germany, e-mail: yhou@ecology.uni-kiel.de