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## EDITED AND REVIEWED BY

Jay E. Diffendorfer,  
United States Geological Survey (USGS),  
United States

## \*CORRESPONDENCE

Jinyan Zhan,  
zhanjy@bnu.edu.cn

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# Editorial: Solutions to high-quality development: Theories and practices in ecological aspects

Jinyan Zhan<sup>1\*</sup>, Shiliang Liu<sup>1</sup>, Hongbo Su<sup>2</sup> and Fan Zhang<sup>3</sup>

<sup>1</sup>School of Environment, Beijing Normal University, Beijing, China, <sup>2</sup>Department of Civil, Environmental and Geomatics Engineering, Florida Atlantic University, Boca Raton, FL, United States, <sup>3</sup>Institute of Geographic Sciences and Natural Resources Research, Chinese Academy of Sciences, Beijing, China

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## Editorial on the Research Topic

### Solutions to high-quality development: Theories and practices in ecological aspects

High-quality development (HQD) first appeared in the report of the 19th National Congress of the Communist Party of China in 2017. The report stated that China's economy had shifted from a stage of high growth to a stage of HQD. It initially referred to the development of the economy. As scholars and the government continue to enrich its connotation, the current meaning of high-quality development includes six main aspects: 1) people-centered, 2) stable macroeconomic growth, 3) fostering competitive enterprises, 4) innovation-driven, 5) marketization, legalization and internationalization, and 6) green development with ecological priority. With the introduction of the Sustainable Development Goals (SDGs) by the United Nations, the concept of sustainable development has become well known around the world (United Nations, 2015). Although HQD and sustainable development share certain similarities, they do have some distinct differences. Sustainable development focuses on addressing the environmental, economic and social aspects of the development process, whereas high-quality development puts more emphasis on development itself, showing a greater ambition for environmental improvement, economic growth and social progress. Therefore, HQD can be described as an initiative focusing on improving the quality and efficiency of development and enhancing human well-being on the basis of sustainable development (Liu et al., 2022). Smart growth is also a concept similar to HQD, however, it emphasizes more on the improvement of land use efficiency in a city or community for environmental protection, economic development, human well-being, etc. (US Environmental Protection Agency, 2022; Smart Growth Online, 2022). HQD is a new concept to guide China's economic and social development, and corresponding

experience from China may also benefit countries in other regions. It is inextricably linked to the implementation of international initiatives and conventions such as the Paris Agreement, the Convention on Biological Diversity and the achievements of the SDGs (Sachs et al., 2019; Huang, 2022).

Global issues such as climate change, biodiversity loss, and ecosystem services reduction have led to great challenges in human development (Cardinale et al., 2012; Wheeler and von Braun, 2013; Liu W. et al., 2022). To achieve HQD, in terms of the ecological aspects, it is necessary to alleviate natural resource conflicts, transform the development modes, solve prominent environmental problems and maintain regional ecological security (Kerr et al., 2007; Huang, 2022). This Research Topic (RT) “*Solutions to High-Quality Development: Theories and Practices in Ecological Aspects*” is a collection of 20 articles, including two theoretical studies and 18 empirical studies. It is intended to encourage scholars to disseminate the most recent theories and practices of HQD in ecological and environmental aspects, and to provide some references for the exploration of possible solutions to achieve the goal of HQD.

The need to optimize resource utilization derives not only from the urgency to resolve the outstanding contradiction between conservation and development, but also the demand to promote a harmonious coexistence between humans and nature. Three articles set out to explore such optimization. The article by Deng et al. focused on China’s rural revitalization strategy and constructed a framework system to improve the efficiency of resource utilization, refine the effect of urban–rural integration, and optimize the efficiency of industrial development to increase farmers’ income. Faced with challenges such as limited space for growing quantity of cultivated land, difficulties in improving cropland quality, insufficient supply of labor resources, uneven distribution of water resources and low utilization efficiency of agricultural water resources, China’s rural areas needs to shift from single to multiple resources to improve resource utilization efficiency, and the urban-rural integration effect needs to move from extensive to lean, while optimizing the efficiency of industrial concentration from management to integrated services. To address water resource management issues, Wang et al. assessed historical virtual water flows and future agricultural water demand in various sectors in Zhangye City in West China, supporting the development of climate change adaptation strategies. The study by Zhao et al. accounted for the ecological water demand of indicator species in the main stream of the Yellow River and provided policy implications for regional water management.

Promoting industrial development and upgrading industrial structure and production efficiency is a necessary path to HQD. A total of four articles focused on this scientific aspect. Zhang et al. assessed the total Gross Ecosystem Product (GEP) of Chinese cropland ecosystems in the last 2 decades. The study

found that the GEP of cropland ecosystems in most Chinese provinces, except developed provinces such as Beijing and Shanghai, showed an increasing trend. Meanwhile, the study by Li et al. found that international trade contributed to the slow growth in China’s agricultural carbon emissions performance over the last 15 years, emphasizing that good ecological and environmental condition are the greatest development advantage of rural areas and that sustainable rural development needs to be promoted in terms of agricultural emission reduction, tourism and service industry development. The article from Wang et al. reported that the overall trend of agricultural eco-efficiency in China increased from 2001 to 2019, and it was mostly the eastern provinces that were of higher agro-ecological efficiency. He et al. also analyzed the spatial and temporal patterns of ecological benefits of grass-based livestock husbandry and the influencing factors in the context of rural revitalization strategies and proposed relevant development suggestions with the goal of revitalizing grass-based livestock husbandry.

The key to effective ecosystems management is to monitoring changes in ecosystem quality and corresponding drivers. In this RT, a total of eight empirical research articles focused on the changes and their drivers in a variety of ecosystems, including grasslands, mountains, plateaus, and urban areas. Li et al. assessed changes in grassland ecosystem services and influencing factors in Hulunbuir and found that soil potassium content was the most influential factor on grassland ecosystem services, while economic and social factors were less influential. In the paper by Jin et al., a framework combining water quantity and ecological risk was constructed to analyze the spatial and temporal variability of water services and ecological risk in the Ziwuling Mountains of China. Also focusing on water-related ecosystem services, the paper by Wang et al. assessed future water production and soil conservation services in the Changbai Mountains, and analyzed the mechanisms by which both services are driven under climate change and Land Use/Cover Change. Madrigal-Martínez et al. calculated land use change and loss of ecosystem service values under glacial retreat and highlighted the urgency of ecosystem restoration and management at the watershed level. Understanding the spatial flow of ecosystem services can be of aid in diminishing the imbalance between supply and demand of ecosystem services, which is a difficult and important focus of current ecosystem service research. Meanwhile, Wang et al. used a network model to simulate the spatial flow of carbon sequestration services on the Qinghai-Tibetan Plateau and investigated the driving role of human activity in changes of carbon sequestration services. Yang et al. reported the changes in vegetation status along the Qinghai-Tibet Plateau highway and clarified the driving mechanisms of climate and distance on ES indicators, which are beneficial for supporting regional ecological restoration along the Qinghai-Tibet Plateau

highway. Derived from ecological security, land ecological security focuses on the sustainable use of land resources on the basis of denoting a state of harmony between people and nature (Liu et al.). In the article by Liu et al., a study in Jinan City, Shandong Province, assessed the historical changes in land ecological security status and its influencing factors. The study found that urban expansion has the greatest impact on the differentiated pattern of land ecological security, and urban development should pay attention to the protection of areas with high levels of land ecological security. At the urban community level, a study by Wang et al. in Beijing analyzed the carbon emissions and influencing factors of household consumption through a household survey, which provides a reference for community management and carbon reduction.

Territorial spatial planning is a spatial blueprint for HQD. Three articles in this RT are related to territorial spatial planning, covering coastal zones and land areas. The study by Guo et al. constructed a system of indicators for coastal spatial management, which provides a basis for the management of coastal spatial planning and facilitates the construction of coastal spaces for HQD. Identifying priority areas for ecosystem restoration can increase the provisioning of multiple ecosystem services and save economic costs. Facing the challenges of landscape fragmentation and habitat loss due to urbanization, Zhai and Huang identified potential ecological networks in urban agglomerations with priority areas for restoration and conservation, providing spatial guidance for the implementation of ecological conservation and restoration projects. Huang et al. took Guizhou Province, China as an example and revealed the importance of considering the influence of spatial structure characteristics of the landscape on ecological restoration effects in the process of ecological restoration.

Two additional papers in the RT were an empirical study on the improvement of the surface net radiation estimation algorithm and an investigation of plant growth mechanisms. Liu et al. improved the algorithm for estimating surface net radiation in mountainous environments with complex topography and verified the accuracy of the algorithm in the Haihe River basin. Yu et al. reported that arbuscular mycorrhizal fungi (AMF) can promote the growth of parasitized plants and activate the plant defense response to insect feeding.

Overall, the 20 articles in this RT brought together the latest practical experiences and scientific findings to support HQD. They cover key scientific issues related to regional HQD such as optimization of resource utilization, industrial upgrading and development, monitoring and attribution

analysis of ecological and environmental changes, and formulation of territorial spatial planning. They also provided science-based suggestions for regional development. Development is the eternal theme of human society. We hope that this RT can trigger more extensive thinking and discussion on the theories and practices of HQD in the academic community, to synergize economic development and environmental protection, and ultimately help human society achieve HQD.

## Author contributions

JZ, SL, HS, and FZ devised the concept for the editorial. JZ drafted the manuscript. SL, HS, and FZ provided editorial comments and revisions. JZ finalized the manuscript and submitted.

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