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Editorial: Sustainable cultivated land use and management

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Editorial on the Research Topic
Sustainable cultivated land use and management

Introduction

Cultivated land is an important resource for human survival and development, making its protection one of the highest global priorities. Healthy, ecological, and highly efficient cultivated lands form the basis of modern agriculture and thus the foundation of food security. In recent decades, rapid urbanization and industrialization have promoted economic development and improved livelihoods worldwide, leading to diversified food and commodity production and consumption. Notwithstanding, land degradation problems including abandonment, pollution, and erosion have emerged during the land-use transition, posing challenges to both the ecosystem service supply and Sustainable Development Goals (SDGs). In particular, intensive cultivated land use and the overwhelming dependence on fertilizers and pesticides have led to agricultural non-point source pollution and greenhouse gas emissions, which further challenge the ecological environment and sustainable development.

Within this Research Topic, we aimed to present a collection of original articles that address the theories, practices, and models for sustainable cultivated land use and management. This Research Topic collected a total of 17 papers, which can be largely divided into the following three areas.

(1) Land use and ecosystem service—a total of six papers, including land-use transitions and their influence on spatiotemporal patterns of the ecosystem service and their contribution to the Sustainable Development Goals.
(2) Cultivated land use—a total of five papers, including spatiotemporal changes and driving forces, vulnerability, and planting pattern change.

(3) Cultivated land management—a total of six papers, including fragmentation identification, productivity, optimization, and fertilization management.

Land use and ecosystem services

Jian et al. identified the dominant morphology of land-use change and explored the recessive morphology and driving mechanisms in Baiyun District, Guangzhou city, China. The results improved the methods for reconstructing the three-dimensional space of land and provided paths for solving the problems of limited land resources and mixed land-use space in China's urban suburbs. Wei et al. calculated the evolutionary process of production–living–ecological space and analyzed the ecoenvironmental effects on typical industrial bases using the integrated ecoenvironmental quality index with a land-use transfer matrix and ecological contribution rate. Ma et al. studied the multidimensional gradient spatial differentiation characteristics of rural ecological land and clarified the impact of natural and human factors on ecological land under different gradients.

Xiang et al. predicted the land-use pattern and evaluated the ecosystem services in the Western Sichuan Plateau, China. This study suggested adjustments of the land-use structure and the management decisions regarding ecological environment protection. Wen et al. revealed the supply and demand patterns of ecosystem services, and they found that population attractiveness, industrial structure, and the NDVI are the main contributors to the coordination of the supply of and demand for ecosystem services. Hu et al. assessed the spatial–temporal changes of ecosystem service values and the SDGs scores in the Beijing–Tianjin–Hebei region (BTH). This study suggested that SDG6, SDG11, and SDG12 should be prioritized to advance the synergistic development of the SDGs in the BTH.

Cultivated land use

Li et al. revealed that significantly increased cultivated land area was to be found in underdeveloped areas in China. Complex interaction between social, economic, agricultural, and natural factors caused the change in cultivated land area in China between 1996 and 2019. Ou and Wang investigated the varied spatiotemporal expansion of greenhouse-led cultivated land in Shandong province, China, from 1989 to 2018. Internal budget expenditures for rural development, local retail sales, the average earnings of local farmers, and external vegetable supply and consumption were the driving forces of greenhouse-led cultivated land expansion. Niu et al. assessed the cultivated land system vulnerability in Sanmenxia city, China. They concluded that vulnerability was affected by the sensitivity and adaptive capacity of human social and economic activities and the capacity of the farmland system to cope with stress. Feng and Wang detected the spatial mismatch of water resources and grain planting pattern changes in China. The depletion of grain production potential in the water-limited regions was suggested to balance the agricultural development between the north and south regions. Lastly, Du et al. analyzed the evolution of cropping patterns based on remote sensing identification and provided a practical basis for establishing high-yield and efficient planting models in the "black soil" region of China.

Cultivated land management

Su et al. improved a land fragmentation measurement model based on natural surface elements and road networks. The new model provides a more reliable and robust measurement of land fragmentation than the existing indices. Xu et al. created a new approach for the identification of irregular fragmented cultivated land with unclear characteristics in sandy areas. The results suggest that scale transformation can be used to improve the accurate and efficient identification of fragmented cultivated land. Lin et al. designed a new method to predict the spatial layout of citrus production in Sichuan province of China in 2025. They provided the polices of stabilized citrus areas and optimized production space for the local government. Liu et al. revealed the positive effect of agricultural machinery services on cultivated land productivity based on a case study in north China. The authors show that increasing smallholders' access to various types of agricultural machinery services can improve the productivity of cultivated land in regions dominated by smallholders. Zhang et al. constructed an optimal land allocation method based on soil moisture characteristics and provided valuable sustainable land optimization solutions for the efficient, sustainable use and protection of land resources in semiarid regions. Wang et al. explored the effects of different fertilizer combinations on the soil organic carbon pool and *L. barbarum* yield under drip fertigation in Ningxia, northwestern China. The results suggest that drip fertigation with 60 mg L^{-1} nitrogen plus 30 mg L^{-1} phosphorus is the optimal practice for carbon sequestration and the sustainable production of *L. barbarum* in arid regions.

The 17 papers in this Research Topic use field experiments, regional investigations, and model simulation and prediction, and they provide interesting and meaningful results and thought-provoking discussions on land use and ecosystem services, cultivated land use, and cultivated land management. We express our thanks to all the authors and reviewers who contributed to this Research Topic. Together, these articles provide a valuable insight into the discussion of sustainable cultivated land use and management and create an exciting impetus for future research. More attention should be dedicated to meet the ever-growing needs of people for a

better life by cultivated land quantity and quality and ecological protection. An ecological environmental impact assessment of cultivated land use is conducive to the coupling of the sustainable use of cultivated land and the sustainable development of human society.

Author contributions

More attentions should be addressed to meet the people's ever-growing needs for a better life by cultivated land quantity, quality and ecological protection. Ecological environmental impact assessment of cultivated land use is conducive to the coupling of cultivated land sustainable use and human society sustainable development.

Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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