农业与资源环境信息工程专题

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中国农业科学院农业信息研究所
联系人：孔令博
联系电话： 010-82106786
邮箱：agri@ckcest.cn
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前沿资讯

1．Satellites reveal hotspots of global river extent change（卫星揭示全球河流范围变化热点）

简介：Rivers are one of the most dynamic components of the water cycle on Earth's surface and play a significant role in the development of human societies, ecosystem sustainability, and regional climate. However, their natural balance has been threatened by human disturbances and ongoing climate change, as evidenced by changes in river extent over recent decades. In order to better understand what is behind these changes, researchers led by Prof. SONG Chunqiao from the Nanjing Institute of Geography and Limnology of the Chinese Academy of Sciences and their collaborators from China and the United States have analyzed water extent variations using four decades' worth of Landsat imagery in order to globally attribute recent changes in river regimes to morphological dynamics or hydrological signals.

来源：EurekAlert

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全文链接：http://agri.ckcest.cn/file1/M00/10/2A/Csgk0GQ3oI6AbIyKAAJot9jdznc543.pdf

学术文献

1．A decentralized approach to model national and global food and land use systems（建立国家和全球粮食与土地利用系统模型的分散方法）

简介：The achievement of several sustainable development goals and the Paris Climate Agreement depends on rapid progress towards sustainable food and land systems in all countries. We have built a flexible, collaborative modeling framework to foster the development of national pathways by local research teams and their integration up to global scale. Local researchers independently customize national models to explore mid-century pathways of the food and land use system transformation in collaboration with stakeholders. An online platform connects the national models, iteratively balances global exports and imports, and aggregates results to the global level. Our results show that actions toward greater sustainability in countries could sum up to 1 Mha net forest gain per year, 950 Mha net gain in the land where natural processes predominate, and an increased CO_2 sink of 3.7 GtCO2e yr−1 over the period 20202050 compared to current trends, while average food consumption per capita remains above the adequate food requirements in all countries. We show examples of how the global linkage impacts national results and how different assumptions in national pathways impact global results. This modeling setup acknowledges the broad heterogeneity of socio-ecological contexts and the fact that people who live in these different contexts should be empowered to design the future they want. But it also demonstrates to local decision-makers the interconnectedness of our food and land use system and the urgent need for more collaboration to converge local and global priorities.

来源：ENVIRONMENTAL RESEARCH LETTERS

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全文链接：http://agri.ckcest.cn/file1/M00/03/58/Csgk0YiOViaAAVP_AIF7sR-Vw8Q856.pdf

2．Integrated assessments of land degradation on the Qinghai-Tibet plateau（青藏高原土地退化综合评价）

简介：Land degradation has become a catastrophic global environmental issue. The current status of land degradation and changing trends of land remain unclear on the Qinghai-Tibet Plateau (QTP). This study integrated an Optimal Land Degradation Index (OLDI) and spatial footprints of three land degradation pathways (i.e., salinization, desertification and soil erosion) to investigate changing trends and degradation risks from 2001 to 2021 on the QTP. The results showed that land improvements were the dominant changing trends on the QTP compared to land degradation, accounting for 18.83% of the whole plateau. The regions with land improvements were mainly distributed in the northeastern QTP. High-risk degraded land covered an area of 0.55 million km2, and low-risk degraded land covered 0.78 million km2. The spatial distribution of high-risk degraded land varied gradually from scattered small areas to increasingly frequent connected patches from southeast to northwest. Potential driving factor analysis illustrated that land degradation resulted from multidimensional driving forcings, including topography, climatic factors, and human activities. The findings in this study can provide great insight for alpine ecosystem development and make adaption to achieve carbon neutrality with global warming.

来源： Ecological Indicators

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全文链接：http://agri.ckcest.cn/file1/M00/10/2A/Csgk0GQ3o-WAenKCAGZDZWhMSdA851.pdf

3．Cultivated land multifunctionality in undeveloped peri-urban agriculture areas in China: Implications for sustainable land management（中国未开发的城郊农业区耕地多功能性：对可持续土地管理的启示）

简介：The spatial planning and sustainable management of peri-urban cultivated land are key aspects of national development in many countries because of the continuing expansion of urban areas and deterioration of agro-ecosystem services. Detailed geo-informational investigation of cultivated land multifunctionality and the spatial interactions and dependencies of these multiple functions is required to inform the currently weak theoretical framework of multifunctionality at the peri-urban scale. Accordingly, the objective of this study was to construct a comprehensive methodology to identify and evaluate cultivated land multifunctionality in a spatial context. Geochemical data were used to measure cultivated land multifunctionality. We evaluated two main functions—the productive function and the ecological function—of an undeveloped peri-urban agriculture (PUA) area in the northern fringe of Changchun City in the black-soil region of northeastern China. For the ecological utilization of PUA areas, tradeoff and synergy analyses of cultivated land multifunctionality and coordinated development under complex land-use patterns were measured using a bivariate local Moran's I method. Results reveal considerable spatial heterogeneity in the two functions, with hotspots or coldspots being found in the PUA area. The productive function presents a less pronounced decreasing trend along the rural-to-urban gradient compared with the ecological function. Tradeoffs and synergies between the productive function and the ecological function occur mainly in the northern (more rural) part of the PUA area, where

the spatial spillover effect of urbanization is relatively low. Cultivated land functions are strongly affected by urbanization-induced land-use types, and the coordinated areas of the productive function are generally consistent with those of the ecological function. According to these results, we delineate nine zones of multifunctionality in the studied PUA area. Given the importance of harmonizing cultivated land multifunctionality to manage limited land resources in a sustainable way, application of the GIS- and geochemistry-based multifunctionality evaluation scheme proposed in this study should be used to guide peri-urban spatial planning and land-use management and inform the policy arena concerning the transition of land use in urban peripheries.

来源：Journal of Environmental Management

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全文链接:http://agri.ckcest.cn/file1/M00/03/58/Csgk0YiOV4WAZO43AKCjUMgZGoc970.pdf

科技图书

1．Food System Innovations and Digital Technologies to Foster Productivity Growth and Rural Transformation(粮食系统创新和数字技术促进生产力增长和农村转型)

简介：This chapter looks at food system innovations and digital technologies as important drivers of productivity growth and improved food and nutrition security. The analysis emphasizes a mix of research feasibility and technology-enabling policy factors necessary to realize pro-poor benefits. Given their transformative potential and the urgency of developing the enabling R&D and policy trajectories required for impact, we highlight genome editing bio-innovations, specifically CRISPR-Cas9, to address sustainable agricultural growth; and digital technologies, including remote sensing, connected sensors, artificial intelligence, digital advisory services, digital financial services, and e-commerce, to help guide the operations and decision-making of farmers, traders, and policymakers in agricultural value chains.

The analysis points to the need to close critical gaps in R&D investments, capabilities, and enabling policies and regulations to accelerate the scaling and adoption of innovations. At the global level, the engagement of low- and middle-income countries (LMICs) with global players should be facilitated to strengthen intellectual property (IP) access and the management of innovations; and NorthSouth, SouthSouth, and triangular cooperation should be promoted to strengthen LMICs' regulatory capabilities. At the national level, countries need to invest in science-based participatory approaches to identify and adapt technologies to local conditions; close regulatory gaps through evidence-based frameworks that enable the rapid development, deployment, and safe use of innovations; close institutional and human capacity gaps by addressing limitations in institutional capacities and coordination, while training a new generation of scientists with the skills needed to develop and deliver innovations; develop an understanding of political economy factors for a nuanced knowledge of actors' agendas to better inform communications and address technology hesitancy; close digital infrastructure gaps in rural areas by promoting simultaneous investments in digital infrastructure and electrification, reducing data costs, and improving digital literacy; and develop sustainable business models for digital service providers to

help them achieve profitability, interoperability, and scale to reach a sustainable critical mass, and thus facilitate the adoption of food system innovations.

来源：Science and Innovations for Food Systems Transformation

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