Title: Values of Sustainability Interventions in China's National Land System
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Abstract:
Addressing the pressing issues of resource depletion and environmental degradation resulting from rapid socioeconomic growth has become imperative for promoting sustainable development. In response to the national scale of sustainability emergency, China implemented extensive programs to conserve and restore ecosystems and biodiversity. Over the past two decades, a cumulative investment of $1.172 trillion has been allocated across 16 national programs aimed at managing the country's soil, forests, and wetlands. Despite the significant investment, the tremendous values stored in these non-marketed natural capitals, which play a crucial role in generating economic services for society, remain unknown.

This paper aims to be the first to evaluate these sustainability interventions on China's Wealth Balance Sheet from the perspective of natural capital. We construct a dynamic land investment model of managing five major land-capital stocks, including forests, grassland, wetland, cropland, and urban land, subject to market imperfections. This model allows natural capital values to be jointly determined with biophysical factors, human behavior, policy intervention, and their own price dynamics. Empirically, we quantify the stock and investment driving forces of annual land conversion in China using a comprehensive land-use dataset from NASA's MODIS product and socioeconomic data from China's county statistical yearbooks from 2001-2020. With the empirical coefficients, we establish trajectories for the evolution of all ecological land types and estimate their shadow values using a numerical programming approach shown in Fenichel and Abbott (2014). We then recover the inclusive wealth of ecological lands given their shadow values and simulated stocks for future decades for the whole country and for every single county in China to better understand the spatial heterogeneity. Moreover, we evaluate four different policy scenarios by adjusting investment levels in distinct sustainable interventions based on the current national programs, and then compare them with the existing inclusive wealth derived from nature.

In this paper, we offer two strategic pathways for China and other nations committed to achieving the Sustainable Development Goals (SDGs). Our first proposition introduces an ecological-weighted GDP, which integrates inclusive wealth considerations within ecological domains, aligning with ongoing sustainable interventions. Secondly, we simulate diverse investment reallocations towards ecological domains to bolster overall national wealth and promote sustainable development. A mere 1% redirection of urban investments toward forests or wetlands has the potential to triple the cumulative inclusive wealth preserved in ecological lands. Additionally, this reallocation is anticipated to yield positive externality by improving productivity on croplands.

Our project yields valuable insights for nations with dual challenges of development and environmental sustainability. It underscores the need to incorporate natural capital considerations into economic and policy frameworks, especially in developing nations like China. By quantifying the accounting prices of ecological lands, we provide a comprehensive evaluation of existing sustainability interventions' effectiveness and offer implications for policymakers, which facilitates strategies for achieving a balance between development and environmental conservation.