

China's Key Ecological Restoration Projects Bring about Considerable Carbon Sequestration Effects, Study Shows

A latest study made by Working Group “Carbon Sequestration Assessment of National Key Ecological Restoration Projects”, which is supported as a strategic priority project of the Chinese Academy of Sciences, revealed that China's national key ecological restoration projects had significantly enhanced the carbon storage of the ecosystem in project areas, promoted the carbon sink function, and achieved considerable carbon sequestration effects. Their findings have been published in the *Proceedings of the National Academy of Sciences of the United States of America* (PNAS).

At the turn of the century, China launched six key national ecological restoration projects to protect its environment and restore degraded ecosystems. They include the Natural Forest Protection Project, the Grain for Green Project, the Three-North Shelter Forest Program (Phase 4), the Yangtze River and Zhujiang River Shelter Forest Program (Phase 2), the Beijing-Tianjin Sand Source Control Project, and the Returning Grazing Land to Grassland Project. Studies had indicated improved ecosystem services thanks to the implementation of these projects, but the vital total C sequestration benefit arising from the six projects was not systematically evaluated.

The working group conducted a large-scale field investigation and a literature survey of the biomass and soil C in China's forest, shrubland and grassland ecosystems across the regions where the projects were implemented, which was about 16% of the country's land area. They investigated the changes in the C stocks of these

ecosystems to evaluate the contributions of the projects to the country's C sink between 2001 and 2010. Over this decade, it was estimated that the carbon stock of ecosystem in the project region increased by 1.5 Pg C (1 Pg = 10^{15} g) with a total annual C sink of 132 Tg C/yr (1 Tg = 10^{12} g), which is equivalent to 50-70% of the national total annual sink from all major terrestrial ecosystems in China and could offset 9.4% of China's annual C emissions from fuel combustion during the 2000s. In addition, over half of this carbon sink (74 Tg C/yr, 56%) was attributed to the implementation of the projects.

This finding indicated that the implementation of the ecological restoration projects have significantly increased ecosystem C sequestration across the country and have substantially contributed to CO₂ mitigation in China. Therefore, the implementation of these projects could be regarded as an important step of China in participating in global environmental governance and fulfilling its commitment to the CO₂ emission reduction targets.

The strategic priority project is led by the CAS Research Center for Eco-Environmental Sciences, with joint efforts from the CAS Institute of Applied Ecology, Northwest A&F University, Wuhan Botanical Garden, the CAS Institute of Geographic Sciences and Natural Resources Research, the CAS Institute of Genetics and Developmental Biology, and the CAS Institute of Botany. Their research is supported by the Chinese Academy of Sciences, the National Major Research Program of China, and the Youth Innovation Promotion Association of CAS.