

Key Progress in Research on Terrestrial Carbon Cycle in China

The academic article “The carbon balance of terrestrial ecosystems in China” coauthored by Prof. Piao Shilong and Prof. Fang Jingyun from the College of Urban and Environmental Sciences of Peking University was published in April 23rd issue of *Nature*, giving an account of the latest progress in the research on the terrestrial carbon sink in China.

The reason that the dynamic change of global and regional carbon cycle and carbon budget has become one of the hot topics in climate change research lies in the fact that it not only bears much on the salient fluctuation of CO₂ density in the air so as to impact the stability of the global climate, but also is closely related to the Kyoto Protocol (an international convention setting caps on the use of fossil fuels in different countries). As one of the largest industrial sources of CO₂ release, China is now the cynosure of all eyes in that the question whether the terrestrial ecosystem in China plays a “carbon sink” or a “carbon source” role is regarded as a major environmental issue by Chinese scientists and the international community as well.

Based on existing land use and resource inventory data, observational data of the CO₂ density in the air, remote sensing data and meteorological data, the research team of the College of Urban and Environmental Sciences of Peking University conducted a comprehensive study on the spatial-temporal pattern and related mechanism of the terrestrial carbon sink/source by taking advantages of such advanced technologies as remote sensing and GIS, together with the research models such as the atmospheric inversion model and the process-based model of carbon cycle in the ecosystem. It is estimated in the research that China’s terrestrial ecosystem maintained a net carbon sink in the range of 0.19—0.26 Pg carbon (PgC) per year in the 1980s and 1990s, accounting for approximately 28%—37% of the total industrial release of CO₂ during the period in question, much larger than that of the European countries (7%—12%) and comparable to that of the US (20%—40%). The carbon sink in China’s terrestrial ecosystem is mainly attributed to the regional climate change, tree planting, CO₂ fertilization and shrub recovery in particular. Besides, such agricultural management practices as “returning more crop stalks into the farmland” also contributed a great deal to the accumulation of carbon sink in China’s farmland ecosystem.

The research adopted, for the first time, both the top-down atmospheric inversion model and the bottom-up process-based research model for the analysis of ground data, presenting a systematical account of the scale and mechanism of carbon sink in China’s terrestrial ecosystem, which sheds light on further understanding the role assumed by the terrestrial ecosystem in the global carbon cycle and proves that the volume of CO₂ absorbed by the terrestrial ecosystem partly offsets the industrial release of CO₂ in China, providing reference for policy making of CO₂ release and offering China more edge in the negotiation under the United Nations Framework Convention on Climate Change.

The same issue of *Nature* carried a comment by Dr. Gurney, a renowned specialist on carbon cycle research, on the significance of the research. The editor of *Nature* stated, “The publication of a comprehensive assessment of China’s terrestrial carbon budget fills a major gap in the geographical spread of carbon balance data”. “This is an impressive paper.” expressed by Dr. Marland, a climate researcher, in the column This week’s news of *Nature*.

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