

China's big investment to fix environmental wrongs shows both people and nature can win

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A village in the Wolong Nature Reserve in China's Sichuan Province is nestled closely with the reserve's biodiversity-rich mountains. Credit: Sue Nichols, Michigan State University

China's massive investment to mitigate the ecosystem bust that has come

in the wake of the nation's economic boom is paying off. An international group of scientists finds both humans and nature can thrive—with careful attention.

The group, including scientists who have done research at Michigan State University (MSU), report on China's first systematic national accounting of how the nation's food production, [carbon sequestration](#), soil and water retention, sandstorm prevention, flood mitigation, and biodiversity are doing, and what trends have emerged. The work, which spans from 2000-2010, appears in this week's edition of *Science* magazine.

"To achieve global environmental sustainability and enhance human well-being, effective government policies can play crucial roles," said co-author Jianguo "Jack" Liu, Rachel Carson Chair in Sustainability and director of MSU's Center for Systems Integration and Sustainability (CSIS).

The paper notes that China's effort to lift hundreds of millions of people out of poverty since the 1970s came at a high cost of environmental degradation, including deforestation and erosion that resulted in devastating flooding. The National Forest Conservation Program (NFCP) and the Sloping Land Conversion Program, which started around 2000, paid farmers and households in critical areas to restore forest and grassland—delivering alleviation of poverty in addition to environmental benefits.

In roughly the first decade, the programs cost \$50 billion dollars.

The researchers examined a staggering amount of data from all of mainland China—satellite images, field studies, historical records and more.

They found that food production and carbon sequestration were the [ecosystem services](#) that increased the most, while the programs contributed most dramatically to carbon sequestration, soil and [water retention](#) and sand fixation. They found varying gains and losses depending on what part of the country they looked at. Sometimes, there were tradeoffs—such as food production and soil retention.

This big-picture look adds to a body of work published in the past few years documenting successes in parts of China. In March, the book "Pandas and People—Coupling Human and Natural Systems" published by Oxford University Press reported the conservation policies have helped recovery of habitat for the world-famous endangered giant pandas.

In March 2013, two parallel papers in the online journal *PLoS ONE* examined gains in human well-being linked to ecosystem services in Wolong Nature Reserve of China—a new approach to quantifying and understanding the benefits that can be reaped by conservation policies.

Some results of this new paper also validate what have been reported across China. In March of this year, for example, several scientists working with CSIS published a paper in *Science Advances* reporting significant recovery in China's forests covered by the NFCP, although they used a somewhat different method. The authors state that this sort of aggressive and robust scrutiny of the wins and losses that come in the wake of sweeping policies already has paid off, allowing China to better target areas for more conservation efforts.

The new Science paper notes that continuing to improve understanding of how people benefit when conservation programs succeed is important to future success.

And the findings hold value beyond China's borders.

"The results of the China Ecosystem Assessment (CEA) show that improving ecosystem services and economic growth can co-exist," the paper says. "Analyses using model simulations in the United Kingdom, the United States and Australia also show that it is possible to increase the provision of key ecosystem services with economic growth through intelligent policy design, although ecosystem services can decline without proper policies in place."

Liu noted that sustainability science continues to demand the holistic approach applied to the CEA, and the increasing use of an integrated framework of telecoupling, which examines socioeconomic and environmental interactions across distance to better understand far-reaching consequences.

"It is hopeful that the experiences from increasing China's ecosystem services can help address China's enormous environmental challenges such as air pollution, water pollution, and resource shortages," he said. "They may also offer useful insights into environmental and poverty problems in other parts of the world."

More information: Improvements in ecosystem services from investments in natural capital, *Science*, DOI: [10.1126/science.aaf2295](https://doi.org/10.1126/science.aaf2295)

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