



# RESEARCH BRIEF

JUNE, 2016

## CHINA'S FIRST NATIONAL ECOSYSTEM ASSESSMENT

New research shows the world's largest eco-payment program is working

### BACKGROUND

China's economy has flourished to become the second largest in the world. Through its pursuit of rapid economic development, hundreds of millions have been lifted out of poverty. But this growth, based largely on heavy industry and manufacturing, has come at high environmental and public health costs. A 2014 OECD report estimated the health costs of China's air pollution in 2010 at \$1.4 trillion. Multiple sources cite a 2013 report by China's Geological Survey estimating that 90% of all Chinese cities had polluted groundwater. Such environmental degradation can severely undermine long-term prosperity — a fact now recognized by the Chinese government.

China first awoke to the consequences of natural capital loss with the flooding of the Yangtze River in 1998. Forests, which in the past absorbed rainfall and

### ABOUT THE RESEARCHERS

This research is the result of a collaboration between scientists at the Chinese Academy of Sciences, led by **Zhiyun Ouyang**, Stanford University's **Gretchen Daily**, **Stephen Polasky** of the University of Minnesota, and **Jianguo Liu** of Michigan State University, with 15 other collaborators. The paper explores returns on natural capital investments in China.

Daily and Polasky are co-founders of **The Natural Capital Project (NatCap)**. NatCap develops practical tools and approaches to account for nature's contributions to society so that leaders worldwide can make smarter decisions for a more sustainable future. It is a joint venture of Stanford University, The Nature Conservancy, the University of Minnesota's Institute on the Environment, and the World Wildlife Fund.



Photo Credit: Gabriele Quaglia

secured riverbanks, had been cut, leaving millions of people more vulnerable to landslides and floods. When torrential rains hit, catastrophic erosion and flooding killed thousands and caused US\$13.2 billion in property damage. To prevent similar natural disasters in the future, Chinese leaders began to make plans to replenish the country's lost environmental assets while simultaneously addressing rural poverty.

**In 2012, China's government — specifically the 18th National Congress of The Chinese People's Political Consultative Conference — declared their intent to harmonize the needs of people and nature by committing to build the ecological civilization of the 21st Century.**

In 2000, the country launched the world's largest natural capital investment and government-financed payment for ecosystem services programs: the Sloping Land Conversion Program (SLCP) and the Natural Forest Conservation Program (NFCP). Since then, more than 120 million farmers in 32 million households enrolled in the SLCP, a land retirement program which compensates farmers for restoring forests and grassland, creating the basis for the world's largest forest restoration effort. NFCP bans logging and is credited with increasing forest cover in China by 1.6% between 2000 and 2010, according to satellite data recently analyzed in a separate article by a team led by Jianguo Liu.



Photo Credit: Robert Thomson

## THE CHINA ECOSYSTEM ASSESSMENT

In 2012, China's Ministry of Environmental Protection and the Chinese Academy of Sciences undertook a national ecosystem assessment to fill a knowledge gap about the ecosystem services and people affected by the conservation policies that began in 2000. The China ecosystem assessment (CEA) was designed to address central questions of how ecosystem services are changing, where important services originate, and what should be protected and restored to increase ecosystem services.

The CEA collected data on food production by crop and examined the level of provision for six other important ecosystem services: carbon sequestration, soil retention, sand storm prevention, water retention, flood mitigation, and habitat provision for biodiversity. The team used the Natural Capital Project's InVEST software, together with other approaches, to explore ecosystem service outcomes.

## KEY RESEARCH FINDINGS — INVESTMENTS IN ECOSYSTEM SERVICES IN CHINA ARE PAYING OFF

The results of China's first national Ecosystem Assessment indicate that conservation investments are paying off. The study shows that ecosystem service improvement and economic growth can co-exist. Key findings include:

- All ecosystem services evaluated over the decade from 2000 to 2010 increased—with the exception of habitat provision for biodiversity, which showed a slight decrease (-3%);
- Food production (with the aid of inputs) increased the most (38%), followed by carbon sequestration (23%), soil retention (13%), flood mitigation (13%), sand storm prevention (6%), and water retention (4%);
- Improvement varied across regions for securing important ecosystem services, for example mountain ranges across the country account for a majority of ecosystem services provided (ranging from 56-80%) while accounting for only 37% of land mass.

The CEA findings have had immediate applications by Chinese officials. Forty-nine percent of China's land area has been incorporated into Ecosystem Function Conservation Areas (EFCAs), designed to secure the nation's most vital natural capital, based in part on the CEA's characterization of important source areas for ecosystem service provision. The results of the CEA have also been applied in national transportation network planning to identify sensitive areas for protection when designing road projects.

## KEY CONSIDERATIONS

This national natural capital assessment shows that China's massive efforts to plant trees on an unprecedented scale is already providing significant benefits, and establishes China as a global environmental leader.

The government's plan to target investments in more sustainable development in environmentally sensitive areas — across nearly half of the country's total area — is also unprecedented, with China going further than any other country in the world in their use of natural capital information as a basis for making decisions.

This new forest and grassland cover across China is creating enough carbon sequestration that it could have a significant impact on climate change, as well as an impact on carbon markets.

Increased tree and plant cover also mark a significant milestone towards ending a long trend of expanding desertification, which is a major contributor to rural poverty and catastrophic dust storms.

The significant improvements in soil retention and flood mitigation mean that new tree and plant cover are successfully absorbing rainwater and holding onto soil, which makes people who live in flood-prone areas safer, improves water quality, and improves overall quality of life.

This assessment is underpinned by massive amounts of data, collected from various departments across the nation, and required pioneering science to make the process fast and efficient.

## CONCLUSIONS

Through careful monitoring and study as these eco-payment schemes are implemented, China is providing a case study for the world, showing how with funding and government leadership, ecosystem services can be restored, while also improving people's livelihoods and creating greater security for businesses who hope to operate there.

The current and potential future impacts of ecosystem service investments in China are enormous, certainly within the country — and also globally, in the form of enhanced carbon sequestration, and perhaps most importantly in lessons on making the investments needed to secure and harmonize natural capital and human well-being everywhere.

This Research Brief presents and expands upon a paper from the June 17, 2016 issue of *Science* magazine, entitled "[Improvements in ecosystem services from investments in natural capital.](#)"