China to protect areas of high ecological importance identified

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Besides smoggy cities, China includes areas of natural beauty such as Jiuzhaigou National Park, in Sichuan Province. Credit: Zhiyun Ouyang

China leads the world in greenhouse gas emissions. Its biggest cities are shrouded in smog. And the country's population is 1.4 billion people and growing. At least to the rest of the world, China isn't known as a leader in environmental mindfulness.

Research from Gretchen Daily, professor of biology at Stanford University, is helping to change that.

Daily's research, recently published in *Proceedings of the National Academy of Sciences*, used eco-mapping software to identify places of high ecological importance for the country. Chinese leaders are using Daily's analytics to establish a series of protected areas, the first of their kind, as a part of their 21st-century ecological initiative.

"It's a historic moment in the evolution of Chinese civilization. It's marked by a recognition that the singular focus on mainstream economic growth over the last century has come at a tremendous cost," said Daily, who is also Bing Professor in Environmental Science.

Guidance, not a price tag

The software used in this study was created by researchers at the Natural Capital Project. Co-founded by Daily, the project is a joint effort among Stanford University, the University of Minnesota, The Nature Conservancy, and the World Wildlife Fund. The project's mission is to identify and conserve areas of high ecological value across the globe.

By using a series of ecological models, the software rates areas based on their ability to sustain human life. For example, a forest provides water purification, flood control, and climate stabilization - all services that support human life.

"Our partners started asking, 'Where does biodiversity matter for how ecosystems function within China?' Essentially, we wanted to better understand which lands would be most valuable, if set aside for biodiversity conservation and ecosystem services," said Steve Polasky, co-author of the paper, co-founder of the Natural Capital Project and professor of ecological and environmental economics at the University of Minnesota.

In this case, the team identified five different vital life support services

in China: flood control, sandstorm control, provision of abundant water (for drinking, irrigation and hydropower), stabilization of soil, and biodiversity. Then, the team mapped which areas of China were most valuable, ecologically speaking, to its people.

The goal isn't to "put a price tag on nature," said Daily, but to provide a practical approach for guiding land use, infrastructure investment and siting, urban planning, investment in water supplies, and other realms of decision-making.

"Today, nature is too often ignored. It's sometimes held up as infinitely valuable, and more typically we say it's not valuable at all, and give it a score of zero in cost-benefit analysis," Daily said. "Neither position is helpful. We need to shine a light on the many ways in which prosperity and well-being depend on nature, systematically and for setting priorities."

China's investment in conservation

The national park system, expected to be formally proposed to Chinese leadership this summer, is only a part of China's 21st-century environmental goals. In the past 10 years, China invested over $100 billion in conservation efforts. Currently, the country is paying 200 million people to protect or restore ecosystems as part of its eco-compensation program - the biggest eco-payment system in the world. The country is now developing and testing a new metric to measure the contribution of nature to human well-being, called Gross Ecosystem Product (GEP).

"China is going further than any other place in so many ways. They are really trying to harmonize local well-being with long-term societal security and prosperity," Daily said.

The team identified priority areas including the lower streams of the Yangtze River, the Min-Zhe-Gan and Wuyi mountains, Nanling, and west and south Yunnan in the southern region. These areas were, for the most part, not a part of China's existing nature preserves and captured only 10-13 percent of the country's most ecologically valuable sites.

Ecologically informed decisions

While the Natural Capital Project's software is already being used in 80 countries, Daily said she hopes that other countries will follow China's example and adopt ecologically informed decision-making processes.

"There are many countries pursuing green growth. What we've developed could be readily adapted and mainstreamed across all countries," said Daily. "If that were to happen, I mean, that's the ultimate dream here."

There is a growing fear among researchers in environmental science that crucial ecological systems, like the climate system that warms the Earth, are going to collapse. Valuing the services that nature provides isn't just beneficial for the economies of countries, argues Daily, but is essential to humanity's survival.

"The future of human civilization depends on getting this right," she said.

More information: Weihua Xu et al, Strengthening protected areas for biodiversity and ecosystem services in China, *Proceedings of the National Academy of Sciences* (2017). DOI: 10.1073/pnas.1620503114

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