

Interactive map shows nature's contributions to people

Interactive map developed by Stanford researchers shows nature's contributions to people

Summary: The researchers set out to understand where nature contributes the most to people and how many people may be affected by future changes. By 2050, up to 5 billion people could be at higher risk of water pollution, coastal storms and under-pollinated crops.

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Story Text:

Nature supports people in critical ways, often at a highly local level. Wild bees buzz through farms, pollinating vegetables as they go. Nearby, wetlands might remove chemicals from the farm's runoff, protecting a community drinking water source. In communities all around the world, nature's contributions are constantly flowing to people. Scientists have mapped these contributions at local levels for years, but a new Stanford-led study puts these local analyses on an [interactive global map](#) that emphasizes nature's declining ability to protect people from water pollution, coastal storms and under-pollinated crops.

The study, [published October 10 in *Science*](#), could inform policy and decision-making around investments in nature. For example, the models suggest that places within the Ganges Basin and parts of Eastern China can be targeted for high-impact investments in natural ecosystems. Preserving or restoring these areas' ecosystems will help bolster the wellbeing of entire communities.

“Thanks to rapid recent technological improvements, we're now able to map these local contributions from nature in a detailed, accessible way at a global scale,” said Becky Chaplin-Kramer, lead scientist at [Stanford's Natural Capital Project](#) and lead author on the study. “By applying this new technology, we are able to clearly see where people are receiving benefits from nature around the world. We also see where people are most likely to lose vital benefits as ecosystems degrade.”

5 billion at higher risk

Chaplin-Kramer and her fellow researchers set out to understand and map where nature contributes the most to people and how many people may be affected by future changes in climate, fossil fuel use and development. They focused on three fundamental benefits that nature provides to people: water quality regulation, protection from coastal hazards and crop pollination. Using open-source software developed by the Natural Capital Project – a global partnership focused on natural capital research and application – they modeled how the flow of these benefits might change in the future.

Across the board, they found that where people's needs for nature are greatest, nature's ability to meet those needs is declining. By 2050, their projections show that up to 5 billion people could be at higher risk of water pollution, coastal storms and under-pollinated crops.

Critically, the team's research shows that these impacts are inequitably distributed. In all scenarios, developing countries shoulder a disproportionate share of the burden.

“Our analyses suggest that the current environmental governance at local, regional and international levels is failing to encourage the most vulnerable regions to invest in ecosystems,” said study coauthor Unai Pascual, co-chair of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services ([IPBES Values Assessment](#)). “If we continue on this trajectory, ecosystems will be unable to provide natural insurance in the face of climate change-induced impacts on food, water and infrastructure.”

People in Africa and South Asia are the most disadvantaged in the face of diminishing contributions from nature. More than half the population in these regions is facing higher-than-average “benefit gaps,” the tangible elements — like vulnerability to coastal storms, water pollution or crop losses — that people feel when contributions from nature stop flowing. The impacts aren't isolated to certain countries, though. Under climate change, projected sea-level rise increases risk to coastal communities everywhere and may impact over 500 million people worldwide by 2050.

Informing policies to invest in nature

The researchers' technological application of integrated, high-resolution data provides an opportunity to incorporate nature into worldwide policy decisions. The vehicle for this is an online viewer that presents complex global data in a digestible way – high-resolution, interactive maps.

The team is looking to policymakers, development banks and other global influencers to use this information to drive sustainable development and conservation.

“Determining when and where nature is most important is critical to understanding how best to enhance people's livelihoods and wellbeing,” said study coauthor Stephen Polasky, a professor of environmental economics at the University of Minnesota and coordinating lead author of the [recent IPBES Global Assessment](#).

Looking forward, the researchers are expanding their analysis to model other ecosystem benefits. They're also looking to more deeply understand where nature's contributions could best support the planet's most vulnerable populations.

“We hope that this work will advance the integration of nature's contributions to people into decision making and further galvanize global action,” said Chaplin-Kramer. “We're equipped with the information we need to avert the worst scenarios our models project and move toward an equitable, sustainable future. Now is the time to wield it.”

The Natural Capital Project is part of the [Stanford Woods Institute for the Environment](#). Co-authors from the Stanford Natural Capital Project include Richard P. Sharp, Charlotte Weil, Katie Arkema, Benjamin Bryant, Anne Guerry, Perrine Hamel, Lisa Mandle, Mary Ruckelshaus, Jessica Silver, Adrian Vogl and Gretchen Daily. Daily is also Bing Professor of Environmental Science in the Stanford [School of Humanities and Sciences](#) and a senior fellow in the Woods Institute. Silver is also affiliated with [EarthLab at the University of Washington](#). Co-authors from the Natural Capital Project core partnership include Kate Brauman, Maike Hamann and Justin Johnson from the [Institute on the Environment](#) at the University of Minnesota, Stephen Polasky from the University of Minnesota's [Department of Applied Economics](#), and Rebecca Shaw from [World Wildlife Fund](#). Co-author Elena Bennet is affiliated with the [Department of Natural Resource Sciences at McGill University](#). Co-author Unai Pascual is affiliated with the [Basque Centre for Climate Change](#), the [Basque Foundation for Science](#), and the [Centre for Development and Environment at the University of Bern](#). Co-author Nick Haddad is affiliated with the [Department of Integrative Biology](#) at Michigan State University's Kellogg Biological Station. Co-author Henrique Pereira is affiliated with the [German Centre for Integrative Biodiversity Research \(iDiv\)](#), the [Institut für Biologie](#) and [CIBIO-InBIO](#).

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