

QnAs with Peter M. Kareiva

For his strident advocacy of people-centered conservation, aimed at striking a balance between economic and ecological interests, Peter Kareiva has been often cast as a maverick among environmentalists. Thanks to a growing infusion of science into conservation efforts in the 21st century, Kareiva, elected in 2011 to the National Academy of Sciences, says the environmental movement has come a long way since its birth two centuries ago. As chief scientist at The Nature Conservancy, a bastion for environmental interests, Kareiva helped launch a collaborative endeavor called the Natural Capital Project in 2006 to develop scientific tools to evaluate the costs and benefits of conserving natural resources in light of development goals. Kareiva discusses the project with PNAS.

PNAS: How was the Natural Capital Project conceived?

Kareiva: The project began as a scientific workshop at the National Center for Ecological Analysis and Synthesis at the University of California, Santa Barbara. We set out to address aspects of tradeoff in the management of natural resources, to ascribe economic value to natural capital, and to determine the kind of input data required for natural resource management. The project is supported by funds from private donors and foundations, as well as through federal grants. It is a collaborative venture with Stanford University, the University of Minnesota, The Nature Conservancy, and the World Wildlife Fund.

PNAS: Can you give our readers an example of the kind of studies you perform?

Kareiva: One example is the assessment of the impact of coastal reefs, marshes, and mangroves on storm surges when major weather systems—like hurricanes and Nor'easters—sweep along a coast. We developed tools for modeling the reduction in wave height attributable to coastal reefs or marshes during storm surges along the United States Gulf Coast and Vancouver Island in Canada, resulting in a quantitative estimation of the potential flood damage, and thus, the economic value of these natural habitats.

PNAS: You have written about the need for a cost-benefit approach to conservation. Are there many areas in the world where such an approach might improve the diversity of species conserved?

Kareiva: The notion of fixed conservation areas like national parks was launched in the US about a century ago. Now that human impacts on the environment have become so prominent—think climate change and the spread of invasive species—conservation is slowly becoming a shifting mosaic of approaches, such as wilderness protection, habitat restoration, and species translocation. So the idea of a cost-benefit approach to conservation is not only desirable but necessary.



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PNAS: Recently, researchers in the project published a report in PNAS showing that dams on the tributaries of the Mekong River might have more adverse effects on local fisheries than those on the main river. What has been the fallout from those findings?

Kareiva: Several conservation organizations, including The Nature Conservancy, are engaged in a Great Rivers project, which includes the Mekong. The finding you cite is so new that it's too early to comment on the outcome; we'll probably know in a couple of years. However, the important fallout from the effort is that we are now in a position to advise a country like Laos that they don't have to sacrifice hydroelectricity to do something smart for the environment. Previously, the conversation was about stopping dam building; this result shows that hydroelectric dams can be operated without great damage to fisheries by following a science-based approach to damming. That approach would help determine the right type of dams, their locations, the permissible flow regimes, and potential effects on the flood plains of the river and its tributaries.

PNAS: You have often lamented a widespread romantic view held by many environmentalists that pristine wilderness must exist outside the sphere of human activity. What are some reasons behind that view?

Kareiva: Part of the reason for that romantic view is aspiration. Many leaders in the environmental movement, including scientists, have had camping, hiking, and backpacking experiences, and enjoy "getting away from it all." We wish that pristine wilderness untrammelled by people were more common but are disappointed to have to face up to

reality. However, that mindset is changing. More and more conservationists accept the fact that human impacts on the environment are unavoidable. Conservationists have begun to see that well-managed selective logging can work and that perhaps community-based fishing might be a better alternative in some places to protected marine areas, to name a couple examples. Within the last five years, there has been a wave of reconsidered strategies for environmental protection.

PNAS: Can you give our readers an example of this new wave of 21st century conservationism?

Kareiva: In traditional conservation, the objective is to maximize the protection of biodiversity. However, 21st century conservation tries to maximize biodiversity without compromising development goals, such as energy and food production. Once those goals are clearly defined, scientific methods can help establish tradeoffs among them. One example is our effort to balance the protection of Mongolia's spectacular wealth of grassland ecosystems with the country's economic interests in gold, copper, and coal mining. By having the scientific analyses and maps of ecosystem services and biodiversity developed before mining permits are issued, governments and corporations can work together to balance environmental concerns with the need for economic development.

PNAS: Your detractors point out that your arguments in favor of human-centered conservation—nuanced and well-researched as they are—could be exploited by profit-minded corporations with little regard for the environment.

Kareiva: I find that attitude toward corporations to be simplistic. There is no doubt that corporations have done damage to the environment, but so have conservation groups, farmers, ranchers, universities, and many other institutions. Importantly, more than 80% of the Fortune 500 companies now make serious efforts to produce sustainability reports; corporations are beginning to take the environment more seriously, although many don't know how to go about it. The goal should be to help corporations better align their economic and environmental objectives.

PNAS: What about the suggestion that a return-of-investment approach to conservation might neglect aspects of the environment that we may not be able to put price tags on?

Kareiva: I think it's a mistake to assume that ecosystem services are all about the dollars. One surprising thing the Natural Capital Project has learned is that in real-world applications we have rarely been asked to come up with dollar values. Instead, we provide quantitative measures of environmental risk factors and the number of people affected as a measure of impact. Further, we factor in cultural values, which we never monetize.

Prashant Nair, *Science Writer*