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Nature Study Highlights Many Paths to Ocean Health

Using a new comprehensive index designed to assess the benefits to people of healthy oceans, scientists have evaluated the ecological, social, economic, and political conditions for every coastal country in the world. Their findings, published today in the journal *Nature*, show that the global ocean scores 60 out of 100 overall on the Ocean Health Index. Individual country scores range widely, from 36 to 86. The highest-scoring locations included densely populated, highly developed nations such as Germany, as well as uninhabited islands, such as Jarvis Island in the Pacific.

Determining whether a score of 60 is better or worse than one would expect is less about

analysis and more about perspective. "Is the score far from perfect with ample room for improvement, or more than half way to perfect with plenty of reason to applaud success? I think it's both," said lead author Ben Halpern, an ecologist at UC Santa Barbara. "What the Index does is help us separate our gut feelings about good and bad from the measurement of what's happening."

The Ocean Health Index is the first broad, quantitative assessment of the critical relationships between the ocean and people, framed in terms of the many benefits we derive from the ocean. Instead of simply assuming any human presence is negative, it asks what our impacts mean for the things we care about.

"Several years ago I led a project that mapped the cumulative impact of human activities on the world's ocean, which was essentially an ocean pristine-ness index," said Halpern, who is a researcher at UCSB's National Center for Ecological Analysis and Synthesis (NCEAS), as well as UCSB's Marine Science Institute. He also directs UCSB's Center for Marine Assessment and Planning. "That was and is a useful perspective to have, but it's not enough. We tend to forget that people are part of all ecosystems -- from the most remote deserts to the depths of the ocean. The Ocean Health Index is unique because it embraces people as part of the ocean ecosystem. So we're not just the problem, but a major part of the solution, too."

[Ocean Health Index: Scientists](#) from [Ocean Health Index](#) on [Vimeo](#).

In all, more than 30 collaborators from universities, non-profit organizations, and government agencies, led by NCEAS and Conservation International, pulled together data on the current status and likely future condition for factors such as seafood, coastal livelihoods, and biodiversity. All together, 10 "shared goals" define the health of the ocean as its ability to provide such benefits now and in the future.

The Index emphasizes sustainability, penalizing practices that benefit people today at the expense of the ocean's ability to deliver those benefits in the future.

"Sustainability tends to be issue-specific, focused on sustainable agriculture, fisheries, or tourism, for example," said Karen McLeod, one of the lead authors who is affiliated with COMPASS, a team of science-based communication professionals. "The Index challenges us to consider what sustainability looks like across all of our many uses of the ocean, simultaneously. It may not make our choices any easier, but it greatly improves our understanding of the available options and their potential consequences."

By re-envisioning ocean health as a portfolio of benefits, the Ocean Health Index highlights the many different ways in which a place can be healthy. Just like a diversified stock portfolio can perform equally well in a variety of market conditions, many different combinations of goals can lead to a high Index score. In short, the Ocean Health Index highlights the variety of options for strategic action to improve ocean health.

"To many it may seem uncomfortable to focus on benefits to people as the definition of a healthy ocean," said Steve Katona, another of the study's lead authors, who is with Conservation International. "Yet, policy and management initiatives around the world are embracing exactly this philosophy. Whether we like it or not, people are key. If thoughtful, sustainable use of the oceans benefits human well-being, the oceans and their web of life will also benefit. The bottom line is 'healthy ocean, healthy people, healthy planet.'"

Around the world, ocean policy lacks a shared definition of what exactly "health" means, and has no agreed-upon set of tools to measure status and progress. "The Index transforms the powerful metaphor of health into something concrete, transparent, and quantitative," said McLeod. "This understanding of the whole, not just the parts, is necessary to conserve and restore ocean ecosystems. We can't manage what we don't measure."

This first global assessment of the health of the ocean provides an important baseline against which future change can be measured. Without such a baseline, there is no way to know if things are actually getting better in response to management and conservation actions.

"The Index can provide strategic guidance for ocean policy," said Andrew Rosenberg, another of the lead authors and a former member of the U.S. Commission on Ocean Policy. "Because the Index includes current status, trends, and factors affecting sustainability for 10 broadly shared goals, it enables managers to focus on key actions that can really make a difference in improving the health of the ocean and benefits we derive from a healthier ocean."

Jake Rice, with the Department of Fisheries and Oceans in Canada, who was not involved in the study, said: "No index, by itself, can be a sufficient guide to case-by-case decision-making. However, the Index can inform the public policy dialogue that is essential to sound governance. Moreover, the Index will improve and adapt with use and experience. All who care about the health of the oceans and the well-being of human societies that depend on them, should be looking forward to both the near-term benefits we can take from this work, and to the evolution of the Index as we gain experience with it."

The authors readily acknowledge methodological challenges in calculating the Index, but emphasize that it represents a critical step forward. "We recognize the Index is a

bit audacious," said Halpern. "With policy-makers and managers needing tools to actually measure ocean health -- and with no time to waste -- we felt it was audacious by necessity."

Other co-authors from NCEAS are Catherine Longo, Darren Hardy, Jennifer O'Leary, Marla Ranelletti, Courtney Scarborough, and Ben Best. Co-authors from Conservation International are Elizabeth Selig, Leah Karrer, and Greg Stone. Jameal Samhuri and Mike Fogarty are from NOAA. Sarah Lester, Steve Gaines, Kelsey Jacobsen, and Cris Elfes are from UCSB. Kristin Kleisner, Daniel Pauly, Rashid Sumaila, and Dirk Zeller are from the University of British Columbia. Other co-authors are Dan Brumbaugh from the American Museum of Natural History; F. Stuart (Terry) Chapin from the University of Alaska Fairbanks; Larry Crowder from Stanford University; Kendra Daly from the University of South Florida; Scott Doney from Woods Hole Oceanographic Institution; Heather Leslie from Brown University; Elizabeth Neely from COMPASS; Steve Polasky from the University of Minnesota; Bud Ris from the New England Aquarium; and Kevin St. Martin from Rutgers University.

The founding partners of the Ocean Health Index are Conservation International, National Geographic, and New England Aquarium. The founding presenting sponsor of the Ocean Health Index was Pacific Life Foundation and a founding grant was provided by Beau and Heather Wrigley.

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† Middle image: Scores for each goal and sub-goal for the United States. Overall Index score is in the middle; the length of each colored "petal" represents the score for that goal.

Credit: Ben Halpern, NCEAS

†† Bottom image: Scores for each goal and sub-goal for Britain. Overall Index score is in the middle; the length of each colored "petal" represents the score for that goal.

Credit: Ben Halpern, NCEAS

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