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EPA Could Expand Ocean Protection, Limit CO2

As if we needed another reason to reduce our CO2 emissions, the oceans are absorbing a potentially unhealthy percentage of the greenhouse gas in a process called ocean acidification.

Now, under threat of lawsuit from the Center for Biological Diversity, the EPA has agreed to reevaluate the Clean Water Act criterion set in 1976 that intended to maintain a stable pH (potential of Hydrogen) level in ocean waters.

The act says that ocean waters should not change more than 0.2 units outside the range of naturally occurring variation of pH level. However, since 1976, scientists have assembled an extensive body of research showing that a 0.2 unit decrease "would pose a risk to the physiology and health of a variety of marine organisms," said 25 leading scientists in a 2007 letter to *Geophysical Research Letters*.



Accordingly, EPA will open up a 90-day comment period beginning April 15 to consider the pH criterion in light of new scientific information, said Miyoko Sakashita, staff attorney at the Center for Biological Diversity. In addition, EPA is developing guidelines to evaluate the health of coral reefs and associated water quality.

Ocean acidification could cause substantial changes in ecosystems. Since the industrial revolution, oceans' pH levels have decreased an average of 0.1, increasing acidity by about 30 percent, according to NOAA. Five percent of that increase has occurred in last 15 years, said Richard Feely, a senior scientist for NOAA who was one of the letter's authors.

"The only time when you had acidification events like this were times of big mass extinctions," said the letter's lead author, Ken Caldeira, a faculty member at the Carnegie Department of Global Ecology at Stanford University. "And it looks increasingly like CO2 was a common thread in the major mass extinctions in Earth's history."

When CO2 gas dissolves in seawater it becomes carbonic acid, which is corrosive to the shells and skeletons of many marine organisms, such as corals or marine shellfish. "At very high CO2 levels, some larval forms of fish die off, and marine squid show sluggish behavior in higher CO2 levels," said Feely. These changes risk dramatic impacts on food webs, key biogeochemical processes, and entire ecosystems.

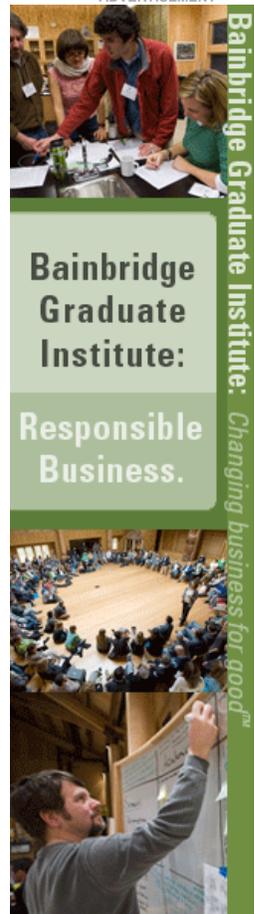
Coral reefs are particularly vulnerable because their bodies grow using the most soluble form of calcium carbonate minerals, said Caldeira. In Australia's Great Barrier Reef last year, he measured growth rates that were 40 percent lower than those measured in the 1970s. "If current emissions trends continue, coral growth rates will decline further and we can expect the reefs to actually start dissolving by midcentury," said Caldeira.

Coral reefs provide surge protection for coastal communities against storms and hurricanes. They provide economic benefit from water-based tourism and recreation, such as scuba, snorkeling, and fishing. They also serve as nursery habitat for a wide variety of fish, including commercial species that spend the rest of their lives in the open ocean. Coastal and marine commercial fishing generates as much as \$30 billion per year and nearly 70,000 jobs, according to NOAA.

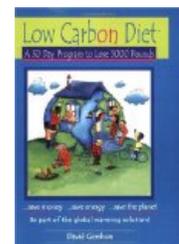
Even if the EPA does revise the Clean Water Act, it's unclear what effect it might have.

"EPA's recommended criteria do not impose legally binding requirements," said Enesta Jones with the agency's press office. Still, Sakashita of the Center for Biological Diversity said that if the EPA imposed stricter pH standards for ocean water quality, states would have to set criteria at least as protective.

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Under the Clean Water Act, water bodies that do not meet water quality standards impel states to reduce pollution — in this case, CO₂, said Sakashita. If a state's coastal waters have changed pH by more than 0.2, it must figure out what's causing the pollution and then set limits on all industries that contribute to that pollution. Eleven coastal states have already adopted saltwater pH values into their water quality standards.

However, Feely said non-coastal states should also be included in an amended Clean Water Act because their emissions can also damage ocean water quality. When we burn fossil fuels, CO₂ enters the atmosphere and moves quickly around the world. About one-third of that CO₂ gets absorbed by oceans over time.

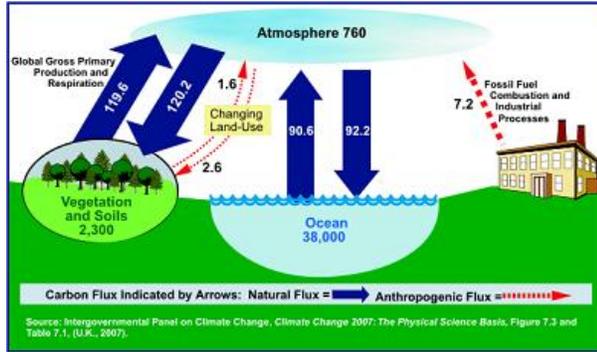
"We have to reduce CO₂ emissions overall because a CO₂ source in Ohio and Kansas is a problem for the coastal states two days down the road," said Feely. "It's important that this is handled equitably at the national level."

The EPA's decision will come by April 15, 2010, said Sakashita. Other laws could also reduce CO₂ emissions, such as the upcoming federal cap and trade regulation, or if the EPA allows states, led by California, to separately regulate vehicle emissions. While these standards all aim to reduce CO₂ emissions, they would operate independently. And to halt climate change and ocean acidification, we probably need all these regulations and more.

Caldeira is frustrated with targets' pace of change: "It should be against the law to build devices that put CO₂ into the atmosphere. It's an engineering and infrastructure challenge. What we do in the next years and decades will affect ocean chemistry for tens of thousands of years."

See also: [Documentary Imagines World Without Fish](#)

Image: Jerry Reid, U.S. Fish and Wildlife Service, via [Wikimedia Commons](#).



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