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Enviros Challenge Dumping Urea in Ocean to Sink Carbon

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This artist's rendition of an Ocean Nourishment Corporation plant shows how the company would pump urea into the ocean to stimulate plankton growth.

Image: Courtesy of Ocean Nourishment Corporation

An Australian company is injecting urea into the ocean, hoping to sequester greenhouse-gas pollution and cash in on carbon credits.

If all goes according to plan, oceanic plankton will thrive on the nitrogen-rich urea broth and absorb carbon dioxide. When the plankton die, they'll sink to the bottom of the sea taking the carbon dioxide with them. The business plan: Companies licensing the technology can sell carbon offsets.

But some scientists worry the technique hasn't been rigorously studied. The nitrogen injections, they say, could feed toxic algae, disrupt poorly understood ecosystems and ultimately release more carbon dioxide than is deep-sixed.

"If we're going to entertain such massive measures, they need to be informed by scientific fact and experimentation, and less by opinion and profit motivations," said ocean fertilization researcher [Kenneth Coale](#), director of the Moss Landing Marine Laboratories in California.

The scheme, conceived by Sydney-based [Ocean Nourishment Corporation](#) and slated for large-scale testing off the coast of the Philippines next year, captures the Wild West reality of climate engineering in the 21st century. Scientists and entrepreneurs hoping to cash in on global warming concerns have proposed everything from [iron seeding](#) to orbital mirrors to reflect the sun. Meanwhile, these practices are governed only by a [skimpy patchwork](#) of laws.

Ocean Nourishment recently dumped one ton of urea into the [Sulu Sea](#). Researchers haven't finished evaluating that data, said managing director Jim Ridley, but noted that early analysis supports claims of plankton nourishment and subsequent carbon-dioxide sequestration.

In the next several months, the company will conduct another one-ton Sulu Sea experiment, this time monitoring the effects more closely. Over three weeks, researchers will track plankton blooms with satellites, combine samples taken directly from the water with geographic information, and observe how the area evolves.

Critics aren't worried about the risks of these early tests. A ton of urea affects just a few hundred square meters of ocean. But depending on the next set of test results, Ridley said, the company could conduct a 500-ton experiment early next year. If that goes well, he said, [ONC](#) will start licensing its technology.

At that scale, unintended consequences, such as toxic algal blooms and food-chain disruptions, could be more profound -- and scientists worry that the company might not notice.

"To date, none of the iron-enrichment experiments have been designed to test these unintended consequences, and none of the urea-enrichment studies are designed to do that, either," Coale said.

Apart from the [often-destructive](#) aquatic effects of nitrogen runoff from industrial farms, only Ocean Nourishment has studied the effects of urea fertilization.

"It's the early days," Ridley said. "We're still very much in the R&D phase."

Nevertheless, the company's website implies that the technology is well-understood. The site already offers [licenses for sale](#) (.pdf). Developing countries from "all over the world" have shown interest, Ridley said.

Critics are skeptical of Ocean Nourishment's ability to measure, much less sell, the carbon dioxide removed from the atmosphere by this process.

"Nobody has a way of measuring how much carbon is sinking into the lower levels of the ocean," said [Jim Thomas](#), a research-program manager at the [ETC Group](#), an

Ottawa-based environmental advocacy organization.

To produce urea, the company would need to build natural-gas-burning factories. Whether plankton blooms would offset the carbon dioxide released by those factories is unknown. Ocean Nourishment factors urea production into its carbon equations, but commercial pressures threaten the integrity of companies pursuing climate modification, Coale said.

He said that people pursuing climate-engineering projects for profit need to be separated from those who decide whether the projects are a good idea. "Right now, they're the same."

Asked whether the company's marketing has outpaced its science, Ridley said, "You might read it that way, but it's not the case."

Edwina Tanner, an oceanographer with Ocean Nourishment's research partner, [Earth Ocean & Space](#), said the company's findings will be submitted to scientific journals in coming years, minimizing the chance of mistakes.

"The scientific community is really overseeing this," Tanner said.

To better regulate geo-engineering, Coale recommends establishing an organization like the [Intergovernmental Panel on Climate Change](#) to regulate ocean fertilization. Thomas wants the [International Maritime Organization](#) to handle the job. Even Ridley agrees that oversight is sorely needed.

"You hear concern from the scientists: What might happen to the oceans? We don't know that yet," he said. "It's inevitable that there will be some kind of United Nations control over these technologies, especially when they're commercialized. I think there has to be."