Ocean Fertilization

OVERVIEW
Ocean fertilization (OF) is a proposed Carbon Dioxide Removal technique and refers to dumping iron filings or other “nutrients” (e.g., urea) into seawater to stimulate phytoplankton growth in areas that have low photosynthetic production. The idea is that the new phytoplankton will absorb atmospheric CO2 and, when the phytoplankton die, the carbon will be sequestered as they sink to the ocean floor. Over the last 30 years there have been at least 13 ocean iron fertilization experiments. However, scientific studies have shown that the amount of carbon exported to the deep sea is either very low or undetectable because much of the carbon is released again via the food chain.¹

REALITY CHECK
OF proposes that dumping iron or urea into the ocean will reduce atmospheric CO2.

GEOENGINEERINGMONITOR.ORG: Analysis and critical perspectives on climate engineering. Contact: info@geoengineeringmonitor.org
IMPACTS

OF studies show how phytoplankton communities quickly become dominated by larger diatoms, which is very concerning because phytoplankton form the base of the marine food chain. Any changes in the phytoplankton community will have unknown, unpredictable, and potentially highly damaging impacts on marine ecosystems. Phytoplankton blooms also reduce oxygen levels, negatively affecting many marine organisms. A modelling study of large-scale iron fertilization predicted that it would lead to significant deep ocean oxygen depletion in the region studied. Iron fertilization could also lead to harmful algal blooms. Other marine life. Modelling studies also predict that commercial-scale iron fertilization of the oceans could have a significant detrimental impact on important fisheries.

A modelling study of large-scale iron fertilization predicted that it would lead to significant deep ocean oxygen depletion in the region studied. Iron fertilization could also lead to harmful algal blooms.

Experiments have shown that a number of greenhouse gases are released through OF, which on a large scale could initiate positive feedback effects on the global climate. For example, one modelling study predicted that any benefits of carbon sequestration by large-scale iron fertilization could be outweighed by nitrous oxide production, a greenhouse gas far more powerful than carbon dioxide.

REALITY CHECK

Numerous outdoor OF experiments have taken place, aided by the fact that such experiments are logistically simple to execute. There are more experiments in the pipeline.
KEY PLAYER: LOHAFEX

One of the first large experiments in OF was the 2009 LOHAFEX expedition, in which researchers, co-sponsored by the Indian and German governments, dumped six tons of iron sulphate over 300 km² of open ocean east of Argentina.

KEY PLAYER: KIFES

The KIFES project is a research programme (2016-2020) designed by the Korea Polar Research Institute and funded by the Korean Ministry of Oceans and Fisheries. It aims to carry out “vessel-based research” on iron fertilization experiments in the Southern Ocean. Five Korean universities and several international institutions, including US and Canadian universities, are among the project’s “domestic/international collaborative networks.” KIFES has chosen a location in the eastern Bransfield Basin, not far from the Antarctic Peninsula, for its dump and is planning a second stage of the project. KIFES's declared interest is to provide “a clear answer as to whether or not ocean iron fertilization is promising as a geoengineering solution.”

Researchers have suggested that ocean fertilization could have damaging effects, including deep ocean oxygen depletion, harmful algal blooms and disruption of the marine food chain.
Most prominent are plans by Oceanos Marine Research Foundation to conduct experiments off the coast of Chile in 2018.

**FURTHER READING**

ETC Group Case Study: Ocean Fertilization near Haida Gwaii  
[http://www/etcgroup.org/content/case-study-ocean-fertilization-near-haida-gwaii](http://www/etcgroup.org/content/case-study-ocean-fertilization-near-haida-gwaii)

Greenpeace: A scientific critique of oceanic iron fertilization as a climate change mitigation strategy. [http://www.greenpeace.to/publications/iron_fertilisation_critique.pdf](http://www.greenpeace.to/publications/iron_fertilisation_critique.pdf)


ETC Group and Heinrich Böll Foundation, “Geoengineering Map,”  
[map.geoengineeringmonitor.org](http://map.geoengineeringmonitor.org)

The Big Bad Fix: The Case Against Climate Geoengineering, [http://etcgroup.org/content/big-bad-fix](http://etcgroup.org/content/big-bad-fix)

**SOURCES**


5. Ibid.


11. Ibid.

12. Ibid.