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Ocean Fertilisation

Ocean fertilisation is a highly speculative and inherently unsustainable technique, which has had to date no full assessment of its potential environmental impacts. It is a false solution to the climate crisis, possibly resulting in a permanent and largely unpredictable change of marine ecosystems. This makes it incompatible with marine reserves and the Greenpeace vision of clean and healthy oceans for the future, and for this reason is not supported.

j) What is Ocean Fertilisation and how does it work?

Ocean fertilisation is the process of dumping large amounts of nutrients (iron or nitrogen-based) into the ocean to stimulate the growth of phytoplankton (algae) blooms, which may then act as a carbon sink, drawing carbon dioxide from the atmosphere. Around one fifth of the global oceans can be described as “high nutrient low chlorophyll” (HNLC) and in these areas primary production of phytoplankton appears to be limited by a lack of iron. The ability to stimulate the growth of algae by adding iron has been demonstrated in a number of experiments, beginning already in 1993, in the world’s oceans. These experimental findings have led to a discussion on the feasibility of a large scale geo-engineering project to mitigate some of the impacts of climate change, through the increased production of phytoplankton to absorb carbon dioxide from the atmosphere and transport it into the deep oceans.

Unfortunately, some of the most biologically rich and diverse ocean habitats are potential targets of ocean fertilisation. For example, the Southern Ocean features prominently in discussions on iron fertilisation given its HNLC status, its surplus of “unused” nutrients and its role as a gateway between the atmosphere and the deep sea. There is also evidence that iron availability in the past may have influenced atmospheric CO₂ over glacial cycles. Modelling has even been carried out to assess the potential CO₂ absorption and removal of carbon to deep waters that could be achieved by large scale iron fertilisation of the Southern Ocean.

ii) Does it have the potential to mitigate climate change?

Ocean fertilisation is increasingly promoted as a solution to climate change, despite the huge uncertainties surrounding its effectiveness and potential negative impacts on ecosystems and biological processes. Although such activities are presented as research projects, the scale on which marine ecosystems would be tampered with, combined with the involvement of substantial commercial interests and the absence of co-ordinated international monitoring and controls on such projects, make it an ever growing threat.

Relatively crude and highly optimistic early modelling exercises have suggested that following a century of iron fertilisation might result in a reduction in atmospheric levels of CO₂ of around 50ppm (25-75ppm). This would involve using half a million tonnes of iron and 2700 ships or 600 aircraft per year with 0.5Gt of carbon sequestered. More recent assessments have been far less optimistic, and have seriously questioned the effectiveness of using ocean fertilisation for this purpose given the logistical efforts required. Hence, the potential climate mitigation potential of using iron fertilisation is likely to be very minimal in relation to current emissions of CO₂ (around 10% of the atmospheric total as a maximum) assuming that all “surplus” nutrients were used.

The Intergovernmental Panel on Climate Change (IPCC) considers iron fertilisation to be no more than 'speculative' as a climate change mitigation strategy. Others go further. For example, in a recent statement, scientists involved in the ongoing Surface Ocean - Lower Atmosphere Study (SOLAS) stress that "ocean fertilisation will be ineffective and potentially deleterious and should not be used as a strategy for offsetting CO2 emissions".

More recently still, the Parties to the London Convention and the London Protocol last year endorsed a "Statement of Concern" from its scientific groups (which provide scientific advice on protection of the marine environment to governments in more than 90 countries worldwide) on ocean iron fertilisation which concluded that "knowledge about the effectiveness and potential environmental impacts of ocean iron fertilisation currently is insufficient to justify large-scale operations". This statement was further endorsed by the United Nations General Assembly in their 2007 Oceans Resolution.

iii) Potential Marine Impacts

The minimal benefits of ocean fertilisation do not outweigh the unknown risks to the oceans and marine habitats. There is even the possibility that emission reductions from iron fertilisation could be lowered further by algal production. Large scale stimulation of primary production of phytoplankton could lead to increased production of methane and nitrogen oxides, both of which are potent greenhouse gases. Alternatively, increased cloud cover might result from increased production of dimethyl-sulphide.

Impacts upon marine ecosystems could result from the de-oxygenation of the water column as dead algae break down. Finally, a sustained period of iron fertilisation could cause irreversible detrimental ecological changes in the long-term. Serious impacts on marine ecosystems could also result from ocean fertilisation with macro-nutrients.

iv) Compatibility with Clean and Healthy Oceans

There is no guarantee that any excess carbon dioxide will be effectively sequestered in the ocean depths by an iron-induced algal bloom resulting from iron fertilisation. At the same time, if ocean fertilisation is occurring in the medium to long-term, there is every possibility that unpredictable, wide-ranging, and potentially irreversible impacts will occur on plankton community structure and ocean ecosystems as a whole. For this reason, ocean fertilisation is not compatible with marine reserves, and Greenpeace's vision of clean and healthy oceans.

v) Greenpeace position on ocean fertilisation

1. Greenpeace opposes ocean fertilisation and considers this a false solution to climate change.
2. Greenpeace strongly opposes giving carbon credits to ocean fertilisation schemes.
3. Greenpeace calls for the use of the precautionary principle and ecosystem approach when evaluating new and emerging activities in and on our oceans.
4. Greenpeace is opposed to any governmental support for ocean fertilisation.

For more information contact:

Dr Paul Johnston, Greenpeace Science Unit (P.Johnston@exeter.ac.uk)
Wendel Trio, Climate Policy Campaigner, Greenpeace International
(wendel.trio@be.greenpeace.org)