



**INTERGOVERNMENTAL OCEANOGRAPHIC COMMISSION
COMMISSION OCEANOGRAPHIQUE INTERGOUVERNEMENTALE
COMISION OCEANOGRAFICA INTERGUBERNAMENTAL**

اللجنة الدولية الحكومية لعلوم المحيطات
政府间海洋学委员会

Paris, 4 April, 2008

STATEMENT OF THE IOC AD HOC CONSULTATIVE GROUP ON OCEAN FERTILIZATION ¹

I. General Comments

1. The IOC ad hoc Consultative Group on Ocean Fertilization believes it is important to open a more complete and inclusive discussion about how ocean fertilization activities might be regulated under the London Convention. Here, we offer only a few broad initial comments.
2. Our goal is to safeguard the ocean against damaging ocean fertilization activities without impeding benign fertilization activities; however the scientific community must work to clearly determine what changes are damaging and which are benign.
3. We do not yet have the level of understanding of the marine environment needed to develop a set of specific regulations that would safeguard the ocean environment from fertilization-type activities.
4. The size of the activity is not the only factor to consider. An ocean fertilization activity might be damaging even if conducted over one square kilometer (for example, over a coral reef) just as another ocean fertilization activity might be benign even though conducted over many thousands of square kilometers.
5. We should promote better scientific understanding of the ocean. Manipulative experiments, including ocean fertilization, are important tools that scientists use to develop a better understanding of the marine environment. Such scientific research should be promoted with a minimum of additional bureaucratic burden. For example, the scientists conducting the experiment should be free to decide which parameters (beyond those required to assure the detection of any significant environmental damage that might reasonably be anticipated to occur) need to be measured to address the questions motivating the experiment.
6. The IOC ad hoc Consultative Group on Ocean Fertilization is a group of scientists. We are not expert in international law or policy. Notwithstanding the lack of specific expertise, members of the ad hoc committee offered two suggestions to help safeguard the ocean against damaging ocean fertilization activities while minimizing burden on benign fertilization activities:
 - a. Under one suggestion, an independent but knowledgeable committee composed of scientists as well as representatives of policy, legal, and industry would assess each proposed fertilization activity on the basis of the risk it poses to the environment. The committee would allow activities to proceed which were assessed to fall below a clearly defined threshold of environmental damage.
 - b. Under another suggestion, legitimate scientific experiments (those with defensible scientific goals and public disclosure of methods and results) would proceed but ocean fertilization activities designed to generate saleable carbon credits or other monetary gain would be delayed until appropriate environmental safeguards can be developed and enacted.

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II. Response of the IOC ad hoc Consultative Group on Ocean Fertilization to specific questions raised by the London Convention and Protocol Scientific Group

1. Existing Scientific Literature generated by, or available at, your organization on the topic:

- The Ocean in a High CO₂ World (2005). Proceedings from the International Symposium; Special Issue of the Journal of Geophysical Research-Oceans, v. 110, 2005.
- The Ocean in a High CO₂ World Meeting Report, Oceanography Magazine, Vol. 17, No. 3, Sept. 2004 (http://www.tos.org/oceanography/issues/issue_archive/issue_pdfs/17_3/17.3_scor_ioc.pdf)
- The Ocean in a High CO₂ World, EOS, American Geophysical Union, Vol. 85, No. 37, September 2004, p351-353.
- The Ocean in a High CO₂ World Research Priorities Report (<http://iodeweb3.vliz.be/oanet/Symposium2004/Symp2004Docs/Research%20Priorities%20Report-Final.pdf>)
- M. Hood and S. Schneegans, A carbon sink that can no longer cope?, A World of Science, Vol. 2, No. 4, Oct-Dec 2004, p 2-5. (<http://unesdoc.unesco.org/images/0013/001372/137292e.pdf>)
- The Ocean Acidification Network (www.ocean-acidification.net), which includes frequently-asked-questions, document lists, and powerpoint presentations on ocean carbon sequestration science.

2. Specific Submission to the Scientific Groups

A. *What constitutes "large scale" in the ocean?*

"Large scale" is a relative term. However, in this case we can relate the experiments to ocean physics scales where large scale motions are those significantly affected by apparent Coriolis forces, typically with length scales of tens of kilometers.

There is no well-established meaning to "large scale" that would allow it to usefully distinguish between activities that would and activities that would not damage the ocean environment (see item 4 above).

B. *A clear justification of the need for experiments at scales of order 200 km by 200 km*

Ocean waters are continuously stirred, with currents at different depths moving at different speeds and in different directions. Both the fertilized patch and any sinking carbon will be transported along with the currents. In the small-scale experiments (tens of kilometers) so far performed, the results are strongly influenced by dilution of unfertilized water into the patch, such that it is difficult to extrapolate the results to larger scales, or to longer times. In particular, estimates of amounts of carbon sequestered to depth from extrapolations of these experiments are very uncertain.

The effects on the fertilized patch of stirring and mixing with water that has not received the fertilization treatment becomes less important near the center of the patch as patch size increases. This would provide incentive to develop experiments at scales of order 200 km by 200 km, this scale being larger than that of typical ocean eddies. For the same reason, it may be easier to assess the influence of surface manipulations on the sinking fluxes of particles when the experiments are at this scale.

Experiments designed to study the impact of ocean fertilization on the lifecycles of megafauna, such as fish, may require spatial scales of order 200 km by 200km.

C. *An assessment of the impacts on oceans of experiments at such scales*

It is impossible to assess the impacts of experiments through information on spatial scale alone. A host of factors, including rates, amounts, concentration, duration and composition of chemical addition, location, time of year, and so on, could all jointly be determinative of ocean impacts.