International Council for Science
Scientific Committee on Oceanic Research

GESAMP
Joint Group of Experts on the Scientific Aspects of Marine Environmental Protection

PRESS RELEASE

4 March 2008

Position of SCOR[1] and GESAMP[2] on Deliberate Nutrient Additions to the Ocean

Deliberate fertilization of the ocean, until recently a subject of mostly scientific interest, has caught the attention of the commercial sector because of its potential to sequester carbon and to increase the production of living marine resources. To be effective for either of these purposes, eventual fertilization would add iron or nitrogen to large areas of the world's ocean. Proposals to realize the potential of ocean fertilization on such scales suffer a major weakness: one does not know how the oceanic ecosystem will respond. Current understanding of how the ocean operates is increasing rapidly, but is still not sufficient to predict the effects of large-scale nutrient manipulations.

Field experiments, carried out in various parts of the world ocean to study the role of iron in ocean ecosystems, have not been able to demonstrate a significant net increase in carbon export to the deep ocean on short or long time scales. These experiments have also raised important and, as yet, unanswered questions about changes in community structure. Ocean fertilization on any significant scale will (by design) impact the species succession and the ecosystem structure and function in the affected areas. Furthermore, the impacts of fertilization are unlikely to be confined to the specific region that receives the fertilizer. Ocean currents mix and move water continuously and so can transport nutrients, the resulting biomass, and decomposition products beyond the target areas, with unknown consequences. Inadvertent anthropogenic additions of nutrients to the coastal ocean are presently causing significant problems such as hypoxia, anoxia and harmful algal blooms. At the present, the long-term consequences of ecosystem alterations from nutrient additions are unforeseeable and may be harmful. The effects of deliberate large-scale nutrient addition may therefore range from the desired and positive to the unintended and negative.

The Scientific Committee on Oceanic Research (SCOR) of the International Council for Science and the Joint Group of Experts on the Scientific Aspects of Marine Environmental Protection (GESAMP) of the United Nations agree that any deliberate large-scale addition of nutrients to the ocean must be conducted in such a way that the outcomes of these experiments are statistically quantified and independently verified with respect to but not limited to:

- Changes in new primary production and total community respiration rates at the fertilization site and "downstream" of the site;
- Assimilative capacity of selected ocean regions;

[1] SCOR is an international nongovernmental organization created in 1957 by the International Council for Science to promote international cooperation in all areas of ocean science (see www.scor-int.org).
[2] GESAMP is an independent group of experts, formed in 1969, that advises the United Nations (UN) system on the scientific aspects of marine environmental protection. It is sponsored by eight UN organizations with responsibilities for the marine environment and provides a mechanism for coordination and collaboration among them (see www.gesamp.org).

- Changes in the drawdown of carbon dioxide from the overlying atmosphere, and carbon dioxide and essential macro-nutrients (P, N, and Si) from the surface waters;
- Changes in the production of carbon dioxide and other gases relevant to climate change (e.g., nitrous oxide, methane, and dimethyl sulfide) in surface and mesopelagic waters;
- Changes in denitrification rates within the oxygen minimum zone;
- Changes in the production of toxins that might be detrimental to other organisms, for example, by harmful algal blooms;
- Changes in the export of carbon to a depth where sequestration for at least 100 years is likely;
- Changes in pH and oxygen concentrations in the water column;
- Changes in biomass, composition, and biodiversity of phytoplankton, bacteria, and zooplankton, and recruitment of fish and shellfish; and
- Changes in food web structure.

To be scientifically credible the design and implementation of large-scale nutrient addition experiments must be transparent and the results must be clearly stated and made available to the scientific community and the general public. Transparency is essential, because any appearance of lack of independence from vested interests lowers the credibility of the results among ocean scientists, environmental organizations, policymakers, and potential investors in carbon credits. Carbon credits for fertilization should not be allowed unless and until reliable methods have been developed to estimate and verify the amount of carbon actually sequestered, and side effects have been properly understood and taken into account. We commend efforts by some commercial ventures to create codes of conduct and obtain outside reviews. It is essential that each stage of these experiments is reviewed by well-qualified experts free of vested interests. The goal of any new experiment on the effects of nutrient addition should be to increase our understanding of ocean processes at adequate spatial and temporal resolution; experiments should build on the lessons and the insights of previous experiments.

For further information please contact:

General Questions about the Scientific Committee on Oceanic Research (SCOR) and SCOR's interests in this topic: Prof. Bjorn Sundby, SCOR President (Canada)—Can be reached at +1 514 398-4883.

General Questions about the Joint Group of Experts on the Scientific Aspects of Marine Environment Protection (GESAMP) and GESAMP's interests in this topic: Dr. Michael E. Huber, Chairman of GESAMP(Australia)— Can be reached at +61 7 3244 7336.

Questions about the effects of iron in ocean ecosystems:
Dr. Ken Buesseler, Senior Scientist, Woods Hole Oceanographic Institution (USA, but on sabbatical in New Zealand) — Can be reached at +64 2 1056 0521 between 9 a.m. and 5 p.m. (New Zealand time).

Questions about iron chemistry in the ocean: Prof. Tim Jickels, School of Environmental Sciences, University of East Anglia (United Kingdom)—Can be reached at +441603 593117.

General questions about GESAMP: Fredrik Haag, GESAMP Officer, International Maritime Organization (United Kingdom), Can be reached at +44 20 7463 4139, or through gesamp@gesamp.org.