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SCIENTIFIC GROUP OF THE LONDON
PROTOCOL – 1st Meeting
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Agenda item 12

ANY OTHER BUSINESS

Challenging ‘geo-engineering solutions’ to climate change: The urgent need for detailed scientific scrutiny and international regulations to protect the oceans from large-scale iron fertilization programmes

Submitted by Greenpeace International

SUMMARY

Executive summary: Recent announcements by the company Planktos of their intentions to ‘fertilize’ 10,000 km² of the seas around the Galapagos Islands with iron nano-particles raise renewed concerns regarding the unpredictability of impacts, the likelihood of unintended and potentially irreversible adverse consequences and the absence of international regulatory controls on such ‘geo-engineering’ projects. Greenpeace International draws attention to recent research papers which illustrate fundamental limitations to scientific understanding of processes controlling oceanic carbon fluxes and, therefore, of the effectiveness and possible adverse impacts of iron fertilization programmes, and calls upon the Scientific Group to identify iron fertilization as an issue requiring urgent consideration by Contracting Parties during the 29th Meeting of the London Convention/2nd meeting of the London Protocol

Action to be taken: Paragraph 4

Related document: LC/SG 30/12

Introduction

1 In March 2007, the United States-based for-profit company Planktos announced its intentions to ‘fertilize’ an area of approximately 10,000 km² of the Pacific Ocean around the Galapagos Islands (Ecuador) with several tonnes of iron nano-particles during May 2007. This proposal is the latest in a series of such ‘geo-engineering’ projects aimed at increasing the fixation of carbon dioxide from the atmosphere by plankton, but the first commercial venture of this scale by Planktos, a company which describes its business as ‘eco-restoration’.

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2 Greenpeace International is deeply concerned about the growing interest in such ‘iron fertilization’ programmes, which are increasingly promoted as a solution to climate change mitigation despite the huge uncertainties surrounding both their likely effectiveness and their unintended adverse consequences for ecosystem structures and processes. Although such activities are presented as research projects, the scales of the manipulations of marine ecosystems which they entail, combined with the involvement of substantial commercial interests, together make the absence of co-ordinated international monitoring and controls on such projects an ever greater and more pressing problem.

3 Iron fertilization programmes, such as that proposed by Planktos, claim wide-ranging benefits but are based on a very incomplete understanding of the manner in which carbon fixation and retention are regulated in the open ocean and, in particular, of the central role played by hydrodynamics, local climatic fluctuations and nutrients other than iron in controlling the development and subsequent degradation of phytoplankton blooms. Greenpeace International draws the attention of the Scientific Group to two recent research papers (Blaine *et al.* 2007, Buesseler *et al.* 2007)¹ which highlight the complexity of iron/plankton/carbon interactions and caution against the simplistic assumptions commonly used in support of iron fertilization programmes. For information purposes, we attach at annex a recent briefing published by the international NGO ETC Group, which summarizes the concerns raised by the Planktos project in particular.

Action requested of the Scientific Groups

4 The Scientific Groups are invited to:

- .1 give the matter of iron fertilization its urgent consideration, taking account of, in particular, the scale of uncertainties and potential for unpredictable and irreversible adverse impacts on marine ecosystems which may result from such activities; and
- .2 identify iron fertilization as an issue requiring urgent consideration by Contracting Parties during the 29th Consultative Meeting of the London Convention/2nd Meeting of the Parties to the London Protocol given the current absence of international regulations under which these activities may be properly evaluated and controlled.

¹ Blain, S, B. Quéguiner, L. Armand, S. Belviso, B. Bomble, L. Bopp, A. Bowie, C. Brunet, C. Brussaard, F. Carlotti, U. Christaki, A. Corbière, I. Durand, F. Ebersbach, J-L. Fuda, N. Garcia, L. Gerringa, B. Griffiths, C. Guigue, C. Guiller, S. Jacquet, C. Jeandel, P. Laan, D. Lefèvre, C. Lo Monaco, A. Malits, J. Mosseri, I. Obernosterer, Young-Hyang Park, Marc Picherall, P. Pondaven, T. Remenyi, V. Sandroni, G. Sarthou, N. Savoye, L. Scouarnec, M. Souhaut, D. Thuiller, K. Timmermans, T. Trull, J. Uitz, P. van Beek, M. Veldhuis, D. Vincent, E. Viollier, L. Vong, & T. Wagener (2007) Effect of natural iron fertilization on carbon sequestration in the Southern Ocean. *Nature* 446(7139): 1070-1074.

Buesseler, K.O., C.H. Lamborg, P.W. Boyd, P.J. Lam, T.W. Trull, R.R. Bidigare, J.K.B. Bishop, K.L. Casciotti, F. Dehairs, M. Elskens, M. Honda, D.M. Karl, D.A. Seigel, M.W. Silver, D.K. Steinberg, J. Valdes, B. van Mooy & S. Wilson (2007) Revisiting carbon flux through the ocean’s twilight zone. *Science* 316: 567-570

ANNEX



**ETC Group
News Release
May 3rd, 2007
www.etcgroup.org**

Geoengineers to Foul Galapagos Seas -Defying Climate Panel Warning

As the UN's top climate science panel, the IPCC, prepares to criticise the idea of geoengineering, one maverick geoengineering company, Planktos Inc, has announced it is about to dump several tonnes of tiny particles into the waters around the Galapagos Islands, covering an area larger than Puerto Rico. Doing so, they claim, will re-engineer the atmosphere, win them commercial carbon credits and perhaps a shot at the \$25 million prize for greenhouse gas reduction put up by Richard Branson. Mainstream scientists are sceptical and environmental and social justice groups are crying foul.

“In a sensible world geoengineering fanatics like Planktos would have their license to operate taken away,” says Jim Thomas of ETC Group. “Instead, they are being allowed to pollute the high seas and are even being considered for a prize! Climate change is a real threat but common sense should not be its first victim.”

On May 4th the International Panel on Climate Change, a body of the world's leading climate scientists will publish policy recommendations to governments on how to mitigate global warming. According to an article from Agence France Presse (AFP) who have seen a leaked draft of that report, the panel gives the “thumbs down” and “pours scorn” on a clutch of wacky plans to intentionally re-engineer large scale ecosystems, referred to collectively as geoengineering: “Geoengineering options...remain largely speculative and with the risk of unknown side-effects” claims the IPCC draft according to AFP (1). The US government has reportedly been lobbying the IPCC to more prominently support geoengineering technofixes in order to sideline the Kyoto Protocol (2).

However, even as the UN report becomes public this Friday in Bangkok, one commercial enterprise, California based Planktos Inc, will be sailing from Florida to carry out a large-scale geoengineering experiment. Planktos, a self-styled ‘eco-restoration’ firm that also doubles as a nuclear fusion company(3), intends to dump tens of tonnes of tiny iron particles over 10,000 square kilometres of ocean around the Galapagos Islands at the end of May 2007. By stimulating a massive growth of plankton, called a bloom, Planktos claims to be able to draw millions of tonnes of carbon dioxide out of the atmosphere into the deep oceans over the next year. Eleven smaller iron fertilization experiments have already taken place.

“The Iron Hypothesis” is the theory first put forward by oceanographer John Martin in 1990. He believed you could cool the climate by growing extra plankton in the oceans, a process that also gives rise to cloud formation. Martin once famously declared: “Give me a half tanker of iron, and I will give you an ice age.” From drafts of the forthcoming IPCC report seen by ETC Group, the UN body is expected to highlight the potential negative impacts of such iron seeding. These

include increased production of nitrous oxide and methane, unintended changes in the plankton that could result in production of toxic blooms and effects on the ocean food chain. Local and international environmental groups are furious at this risky gamble with sensitive marine ecosystems spurred by the profit-making incentive of market-based carbon trading.

“This is an irresponsible and unpredictable venture by purely profit-driven individuals,” said Elizabeth Bravo of Ecuador-based Acción Ecológica. “It threatens our climate, our marine environment and the sovereignty of our fisherfolk and it should be stopped.” The Galapagos Islands are a UNESCO world heritage site under the sovereignty of Ecuador.

“Climate change should to be tackled by reducing emissions, not by altering ocean ecosystems,” said Dr Paul Johnston, Head of Greenpeace International’s Science Unit, “Planktos is intending to conduct this reckless experiment in waters around the Galapagos Islands which are globally significant in biological terms and should be designated as fully protected marine reserves.”

Last week the science journal *Nature* published a study on iron seeding authored by forty-seven ocean scientists.(4) They concluded that such attempts to artificially seed the ocean were unlikely to sequester much carbon dioxide. Their results, they say, “mean the end of the ‘geoengineering’ utopia that consists of artificially seeding the oceans with iron.”(5) As one of the scientists, Ulf Riebesell, a biological oceanographer at the Leibniz Institute of Marine Sciences in Kiel Germany told *Nature* bluntly, “You just can’t achieve nature’s efficiency. That’s why geoengineering the ocean won’t work.”(6) This scientific reality hasn’t deterred Planktos, which hopes to convince the market that they can sell plankton-powered carbon ‘offsets’ to consumers to salve guilty consciences. As Planktos CEO Russ George admitted in a 2003 radio interview with National Public Radio in the USA, “It’s really more of a business experiment than a scientific experiment.”(7)

As worrying, Planktos boasts on their website that the iron they dump will be in nanoparticle form because nanoparticles float longer than normal particles.(8) (although Planktos have given contrary information in person). If this is true, then the Planktos experiment may be the largest intentional release of engineered nanoparticles ever undertaken. The last four years have seen a growing scientific consensus that the altered properties exhibited by nanoparticles could have negative toxicity effects on the environment and for human health. In 2004 the UK’s Royal Society and Royal Academy of Engineering issued a recommendation that environmental applications of nanoparticles should be prohibited,(9) a call echoed by many environmental groups. Planktos claims they will be dumping their particles in international waters and so are not bound by international treaties or permit requirements.

In a further twist of the ridiculous, Planktos has also invited airline billionaire Richard Branson, Chairman of the Virgin Group, to join them in the Galapagos(10). In March Branson announced The Virgin Earth Challenge, a US \$25 million prize to whoever could commercially develop a working geoengineering technology (See www.virginearth.org). Unfortunately, Planktos is not the only company competing to technologically alter the climate. In February ETC Group published a report, “Gambling with Gaia”, describing a clutch of companies pursuing geoengineering business plans.

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ETC Group's report on geoengineering, "Gambling with Gaia", is available online at
www.etcgroup.org/upload/publication/606/01/geoengineeringcomfeb0107.pdf

[1] Richard Ingham "Oddball schemes to fix global warming get thumbs down", AFP, 29 April 2007.

[2] David Adam, "US Government answer to global warming: Smoke and giant mirrors," The Guardian, 27 January 2007.

[3] Planktos 'mirror' company D2fusion shares same most of the same management team as Planktos – see www.d2fusion.com

[4] Blain S et al, "Effect of natural iron fertilization on carbon sequestration in the southern ocean." Nature vol. 446. 26 April 2007. 1070-1074 (2007)

[5] CNRS: "Fertiliser les océans : la fin d'une utopie?" - April 26, 2007, on the Internet at <http://www2.cnrs.fr/presse/communique/1086.htm>

[6] Quirin Schiermeier, "Only mother nature knows how to fertilize the ocean - Natural input of nutrients works ten times better than manmade injections" published online in Nature, April 23, 2007. , on the Internet: <http://www.nature.com/news/2007/070423/full/070423-8.html>

[7] Wendy Williams "Living on Earth; Iron fertilization", NPR, 30 May 2003, transcript at http://www.loe.org/series/iron_fertilization/

[8] According to Planktos, Inc. website: "...we use this material in a nano-particle form where the particles are so small that the sink rate is measured in weeks and months as opposed to minutes." <http://www.planktos.com/educational/thedebate.htm> (viewed May 1, 2007).

[9] Recommendation 5, chapter 10, Royal Society and Royal Academy of Engineering, "Nanoscience and nanotechnologies: opportunities and uncertainties" published on 29 July 2004.

[10] Planktos News Release, "Planktos Offers Branson Chance to Help Win his own Prize, 10 February 2007. on the Internet:

<http://www.planktos.com/Newsroom/PlanktosOffersBransonChancetoHelpWinhisownPrize.html>