REPORT OF THE LIAISON GROUP MEETING ON CLIMATE-RELATED GEO-ENGINEERING AS IT RELATES TO THE CONVENTION ON BIOLOGICAL DIVERSITY

I. OPENING OF THE MEETING

1. The meeting was opened at 2 p.m. on Wednesday, 29 June 2011.

2. Ms. Jaime Webbe, from the Secretariat of the Convention on Biological Diversity, welcomed participants on behalf of the Executive Secretary and thanked the Government of the United Kingdom of Great Britain and Northern Ireland and the Government of Norway for co-funding the meeting.

3. Participants introduced themselves and provided a brief introduction on their background and expertise.

4. The meeting agreed that Mr. Robert Watson from the Department of Environment, Food and Rural Affairs (Defra) of the United Kingdom of Great Britain and Northern Ireland, should act as the Chair of the meeting. Ms. Georgina Mace from Imperial College London was later elected as a Co-Chair.

5. Ms. Webbe provided participants with an overview of the mandate, guiding principles and documents available for the consideration of the group.

6. Mr. Watson clarified that the group should aim to produce a longer document (approximately 50 pages) with a 10-page executive summary, which will form the report to the Subsidiary Body for Scientific, Technical and Technological Advice (SBSTTA) of the Convention on Biological Diversity.

7. Mr. Watson guided the group to both consider the aspects of geo-engineering that participants were familiar with and to identify the uncertainties and suggest how these uncertainties should be managed. Mr. Watson suggested that the discussion on definitions of climate-related geo-engineering should be quite brief and focused on main elements and issues of relevance to the mandate. For the discussion on impacts of geo-engineering approaches on biodiversity, Mr. Watson suggested that the report of the International Geosphere-Biosphere Programme (IGBP) Symposium on Ecosystem Impacts of Geoengineering, held on 31 January 2011 in La Jolla, San Diego, California, United States of America,[1] could form the basis of the report in terms of structure. Furthermore, Mr. Watson suggested that all content should be well referenced and that the peer review process should be robust and inclusive.

[1] Russell, L.M., et al. (2011). Ecosystem Impacts of Geoengineering: A Review for Developing a Science Plan. Draft report available at: http://aerosol.ucsd.edu/IGBPworkshop

8. Participants discussed the scope and mandate of the liaison group and agreed that the workshop should focus only on climate-related geo-engineering. Furthermore, participants emphasized the need to consider all three levels of biodiversity (genetic, species and ecosystems) and to look not just at ecosystem structure but also at ecosystem function. An outline of the programme of the meeting is included in annex I below, and a list of participants is provided in annex II.

II. DEFINING GEO-ENGINEERING

9. The main issues identified during the discussion on the definition of geo-engineering include:

(a) The need to look differently at those approaches that refer to well known and established technologies, versus those technologies that are new, emerging and untested;

(b) The appropriateness of including large-scale reforestation and afforestation and biochar;

(c) The importance of considering the scale of the intervention, noting that some activities, in order to have any impact, would have to cover a very large scale;

(d) The exclusion of carbon capture and storage based on the issue of permanency of the storage, noting that the special report of the Intergovernmental Panel on Climate Change (IPCC) on carbon capture and storage[2] contains guidelines that would make the likelihood of leakage quite small;

(e) Options for definitions based on a "threshold" amount of carbon dioxide (CO_2) removed from the atmosphere or solar insolation changes;

(f) The intent versus the impact of geo-engineering activities, noting that some activities may not have climate-related intentions but may, in fact, have significant impacts on the climate. Furthermore, intentions are transient.

Developing a definition

10. Participants started with the definition of climate-related geo-engineering that is included in the footnote of paragraph 8 (w) of decision X/33,[3] and made modifications.

11. Participants decided to remove the mention on the exclusion of carbon capture and storage from fossil fuels as it is already implied in the definition, and to also exclude the intentionality clause as it could be problematic. Participants also mentioned that defining "large scale" may be difficult; therefore this term was retained in brackets. It was suggested to delete "may affect biodiversity" as this puts the burden of proof on the biodiversity impact. It is also redundant as any change in the climate will affect biodiversity one way or another. Participants noted that the above definition refers to current technologies but might exclude future interventions such as methane sequestration.

---

[2] IPCC Special Report on Carbon Capture and Storage. Summary for Policymakers and Technical Summary. IPCC, Geneva, Switzerland. http://www.ipcc.ch/pdf/special-reports/srccs/srccs_summaryforpolicymakers.pdf

[3] The footnote of paragraph 8 (w) of decision X/33 reads as follows:

> Without prejudice to future deliberations on the definition of geo-engineering activities, understanding that any technologies that deliberately reduce solar insolation or increase carbon sequestration from the atmosphere on a large scale that may affect biodiversity (excluding carbon capture and storage from fossil fuels when it captures carbon dioxide before it is released into the atmosphere) should be considered as forms of geo-engineering which are relevant to the Convention on Biological Diversity until a more precise definition can be developed. It is noted that solar insolation is defined as a measure of solar radiation energy received on a given surface area in a given hour and that carbon sequestration is defined as the process of increasing the carbon content of a reservoir/pool other than the atmosphere.

12. The following definition was proposed:

> *A deliberate (large-scale) (technological) intervention in the (planetary) environment to counteract anthropogenic climate change, including through solar radiation management and removing greenhouse gases from the atmosphere.*

13. The group later made additional modifications to this definition (see section V below).

14. Participants decided to include all solar radiation management as geo-engineering, as well as large-scale changes in the CO_2 exchange between the ocean/land and atmosphere.

Solar radiation management (SRM)

15. Participants defined the types of interventions that can fall under the solar radiation management category and discussed what is known about their spatial and temporal characteristics.

16. Solar radiation management includes, *inter alia*:

- Changes in stratospheric aerosols;
- Changes in cloud reflectivity;
- Changes in surface albedo (crop albedo, ocean albedo changes through bubbles);
- Mirrors in space.

17. Participants highlighted the importance of including information on how reversible or irreversible geo-engineering interventions and impacts are, and noted that a better monitoring system should be developed in order to establish and understand causal effects. In addition, many variables, such as the time of year, need to be taken into account when evaluating geo-engineering activities.

Carbon dioxide removal (CDR)

18. The group identified the following activities relating to carbon dioxide removal:

- Increase the net uptake of CO_2 from the atmosphere to the ocean
- Increase the net uptake of CO_2 from the atmosphere to the land (taking into account the range of views on afforestation and reforestation as they relate to geo-engineering). Some examples mentioned include: soil carbon via livestock management, artificial trees and biochar;
- Terrestrial biomass storage in oceans (putting crop waste in the ocean in high sedimentation areas);
- Bio-energy carbon capture and storage (BECCS);
- Methane combustion or seabed capture (this point was not included in the proposed definition).

19. Participants highlighted the need to differentiate between established approaches (e.g., those for which scientific tests and models have already been carried out and for which the technology has been developed) and speculative approaches (e.g., wind-turbine spray reaction and water-vapour removal).

20. Participants noted that while the current approaches are focused on CO_2, there may be scope for the removal of other greenhouse gases in the future. Regarding methane, participants noted that this would be likely to involve capture before it reaches the atmosphere and therefore would not be included in the current definition. The group may consider nitrous oxide (N_2O) capture when discussing biochar.

Baseline

21. The group discussed the baseline for assessment of geo-engineering activities (e.g., what are geo-engineering impacts tested against) and the need to consider the possible positive impacts on biodiversity.

22. Given that there is a range of plausible scenarios from the Intergovernmental Panel on Climate Change (IPCC) and that emissions from recent years exceed the highest scenario, global emissions are predicted to increase until at least 2015 and 2016 and will peak at that point only if there is very strong mitigation action taken. The group agreed that they should describe the impacts of climate change if nothing is done by using information from the report of the Second Ad Hoc Technical Expert Group (AHTEG) on Biodiversity and Climate Change.[4]

23. Participants also mentioned the need to consider the cultural diversity impacts (e.g., who is doing the geo-engineering and who will be impacted by the biodiversity losses and loss in the provision of cultural ecosystem services).

24. The group agreed to use the document resulting from the La Jolla meeting as a starting point for the evaluations of the impacts of climate-related geo-engineering on biodiversity, but to add and/or remove parts based on the mandate of the group and focusing on policy relevant points.

25. Other suggested resources include the outcomes of the IPCC Expert Meeting on Geoengineering that took place in Lima from 20 to 22 June 2011 and which looked at the costs and technical challenges of geo-engineering. It was also suggested to look at a public dialogue on geo-engineering led by the Natural Environment Research Council (NERC), although there was no evaluation of the technologies.

III. PRESENTATIONS

26. Ms. Georgina Mace from the Imperial College London delivered a presentation covering the reasons geo-engineering is being considered including the need to avoid the negative impacts of climate change bearing in mind that it is extremely unlikely that we will return to CO_2 concentrations of 350 ppm. However, Ms. Mace highlighted that there are a number of questions remaining regarding geo-engineering, including who would implement it, what the impacts would be and how it could be regulated. Ms. Mace informed the participants that the Royal Society report[5] assessed (i) effectiveness, (ii) timeliness, (iii) safety, and (iv) costs. With regards to solar radiation management (SRM), Ms. Mace pointed out that SRM will only approximate past climate because, although it will affect temperature, it does not address CO_2 concentrations in the atmosphere as well as the associated impacts. With regards to carbon dioxide removal (CDR), although impacts are expected to be slower, such techniques would do more to address the root causes of climate change (i.e. increased greenhouse gases in the atmosphere). Ms. Mace further highlighted the policy and governance issues associated with geo-engineering, including the concept of the moral hazard, in which the technological fix may lead to a slowdown in other climate change mitigation measures. Finally, Ms. Mace reminded participants that some people do see geo-engineering as the only hope for some vulnerable species and ecosystems, especially when considering the projected extinction risks for species associated with global mean temperature increases.

27. Participants emphasized the need to consider the impacts of geo-engineering on biodiversity under a changed climate and the need to make the point that even with severe reductions in CO_2 emissions, it will take a long time period to return to pre-industrial levels unless we achieve negative emissions. Participants also noted that many climate models ignore biological feedbacks.

[4] UNEP/CBD/AHTEG/BD-CC-2/2/6, available at http://www.cbd.int/doc/?meeting=AHTEG-BDCC-02-02

[5] The Royal Society (2009). Geoengineering the climate: science, governance and uncertainty. London, 82 pages.

28. Mr. Andrew Parker, from the Royal Society, provided a brief introduction on the public dialogue on geo-engineering, which revealed a preference among the general public for natural techniques.

29. Mr. Stephen Salter, from the University of Edinburgh, delivered a short informational presentation on the topic of cloud albedo control for reversal of global warming.

IV. OUTLINE OF THE LIAISON GROUP REPORT

30. The group agreed that the following points should be addressed in the report:

- General information on geo-engineering techniques and definitions;
- Overview of impacts of climate change on biodiversity;
- Potential impacts of different approaches.

31. Accordingly, participants agreed on a draft outline for the document and expanded the sections before breaking into drafting groups. The outline included:

1. Introduction
2. Defining geo-engineering
3. Features of different approaches to geo-engineering
4. Projected changes in atmospheric composition and climate
5. Short summary of climate change impacts on biodiversity and feedbacks
6. Evaluation of approaches in relation to biodiversity and ecosystem services.

32. Participants also identified possible criteria to consider when evaluating the impacts of geo-engineering approaches on biodiversity:

- Timescales;
- Scale of reversibility / frequency response, national versus regional versus global (implementation and impact issues);
- (Costs);
- Readiness / state of knowledge (technology and impacts on climate);
- Risks / unintended consequences;
- Impacts of cessation;
- Impacts of combination of techniques.

V. DRAFTING GROUPS

33. The meeting split into drafting groups. One group, co-chaired by Ms. Mace and Mr. Watson, was charged with drafting the introduction of the report, including the mandate of the liaison group, the section on defining geo-engineering, and the section on the features of different approaches to geo-engineering.

34. Another group, co-chaired by Ms. Ana Delgado, from Defra, and Ms. Karin Zaunberger, from the European Commission's Directorate-General for the Environment (DG Environment), was charged with drafting the sections on projected changes in atmospheric composition and climate. Mr. Phillip Williamson, from the University of East Anglia, chaired the group working on the short summary of climate change impacts on biodiversity and feedbacks.

35. Regarding the section on the evaluation of approaches in relation to biodiversity and ecosystem services, the group decided to split the analysis into two main categories: 1) Solar radiation management (SRM) approaches, and 2) Carbon dioxide removal (CDR) approaches. Mr. Andrew Parker chaired the group which evaluated SRM approaches in relation to biodiversity and ecosystem services, while

Mr. Chris Vivian, from the Centre for Environment, Fisheries and Aquaculture Science (Cefas), chaired the group evaluating CDR approaches.

Section 1. Introduction

36. Ms. Webbe introduced the work done by the drafting group in charge of this section. She introduced the mandate of the group. The main elements of this section come directly from decision X/33 of the Conference of the Parties. This section acknowledges the range of views among participants with regards to definition. Therefore, the report will be inclusive of all views and take into account what we currently know about geo-engineering while noting that there are many emerging technologies. The introduction highlights that governance is important but that it will not discussed in the report given that the focus is on biodiversity. The introduction lists the key sources of information that were used by the group.

Section 2. Defining geo-engineering

37. The drafting group decided to start with the definition defined earlier, while keeping brackets and using the word "*inter alia"* instead of "including". The drafting group provided the two options below:

1. A deliberate (large-scale) (technological) intervention in the planetary environment to counteract anthropogenic climate change through inter alia solar radiation management or removing greenhouse gases from the atmosphere;

2. A deliberate (large-scale) (technological) intervention in the planetary environment to counteract anthropogenic climate change.

38. Because of the diversity of views regarding what should be included in the definition of geo-engineering, participants suggested to add a paragraph explaining that the group did not reach complete agreement on the definition.

Section 3. Features of different approaches to geo-engineering

39. Mr. Watson introduced this section. The introduction to the section highlights the range of views that exists with regards to the definition of climate-related geo-engineering and provides a description of both SRM and CDR. Participants commented that it is important to discuss the issues of scale and uncertainty in the introduction. The tone should also highlight that we do not know everything when it comes to geo-engineering. Mr. Watson presented a draft table listing the different approaches selected by participants, with columns for how they rate in terms of effectiveness, readiness, safety and reversibility. He noted that the draft table should also contain information on the level of effectiveness of the approach (national, regional or global). It was also suggested to include information on potential transboundary effects of the approaches, and to note where there could be unpredictable side effects. Finally, Mr. Watson noted that the short document could summarize the information in a table while the longer document could contain more detailed information.

40. Participants commented that it could be useful to use a "traffic light system" when rating the different approaches in order to take uncertainty into account.

41. The information is partly taken from the Royal Society report, but the group may wish to highlight where more research/information is needed, and to give a different rating if the group's evaluation is different.

Section 4. Projected changes in atmospheric composition and climate

42. Ms. Ana Delgado introduced this section. This section presents four greenhouse gas scenarios from the IPCC fourth assessment report. Participants noted that more scenarios including mitigation options will be presented in the IPCC fifth assessment report to be released in 2013. Participants also noted the gaps in the fourth assessment report in terms of sea-level rise, failing to take into account the melting of the Antarctic and Greenland ice sheets. Participants suggested adding another graph with the scenario for CO_2 emissions only and one on changes in ocean pH over time.

Section 5. Short summary of climate change impacts on biodiversity and feedbacks

43. Mr. Phillip Williamson introduced this section, which includes findings from the Second Ad Hoc Technical Expert Group on Biodiversity and Climate Change regarding the main impacts of climate change on biodiversity. The section highlights the interlinkages between biodiversity and climate change: biodiversity is not only impacted by climate change but also has a role to play in climate regulation. This section also addresses ocean acidification.

Section 6. Evaluation of approaches in relation to biodiversity and ecosystem services

44. Mr. Andrew Parker and Mr. Chris Vivian introduced the work of the drafting group with regards to the evaluation of geo-engineering approaches in relation to biodiversity. The groups organized their work into tables, one for SRM approaches and another for CDR approaches. The tables included the following columns: characteristics, specific biodiversity/gene benefits (relative to control), specific biodiversity/gene drawbacks, mitigating factors, and further assessment. The group commented on the possible need to modify the columns. These tables summarize existing information from key sources, but more work remains to be done to complete the table with the missing information. Mr. Parker and Mr. Vivian agreed to act as lead authors for these sections and to consult with relevant experts to gather more information.

45. The group also recognized the need to address the social, economical, cultural and ethical considerations of geo-engineering approaches. Mr. Victor Galaz, from the Stockholm Resilience Centre, chaired a sub-group which drafted a section addressing such considerations.

VI. TIMELINE OF THE WORK OF THE LIAISON GROUP

46. The group identified the following lead authors for the different sections of the report as follows:

Section	Title	Lead author
1	Introduction	Jaime Webbe
2	Defining geo-engineering	Robert Watson
3	Features of geo-engineering approaches	Robert Watson
4	Summary of observed and projected climate change	Phillip Williamson / Paulo Artaxo
5	Summary of climate change impacts on biodiversity	Phillip Williamson
6 - SRM	Evaluation of observed and projected impacts of geo-engineering on biodiversity	Andrew Parker
6 - CDR	Evaluation of observed and projected impacts of geo-engineering on biodiversity	Chris Vivian

47. For section 7, on the social, economic and cultural considerations of geo-engineering impacts on biodiversity, the lead author during the meeting had to withdraw. The Secretariat agreed to compile submissions and comments on this section on behalf of the co-chairs.

48. The group also agreed on the following timeline for its work:

Step	Description	Deadline
Preparation of the first draft	Draft of each section from lead authors to the Secretariat	17 July 2011
	Draft of compiled document from the Secretariat to the meeting participants	20 July
	Comments on the compiled document from the meeting participants to the Secretariat	10 August
	Compiled comments on each section from the Secretariat to the lead authors	12 August
Preparation of the revised draft	Draft of each section from lead authors to the Secretariat	28 August
	Draft of compiled document from the Secretariat to the meeting participants	31 August
	Comments on the compiled document from the meeting participants to the Secretariat	14 September
	Secretariat to integrate comments in consultation with the lead authors	19 September
	Chairs and Secretariat to prepare one-page and ten-page summaries	19 September
First peer review	Comments from scientific and technical community, indigenous peoples and local communities and other stakeholders to the Secretariat	3 October
	Draft of compiled document from the Secretariat to the meeting participants	7 October
Preparation of final draft	Meeting of lead authors	Week of 10 October
	Final draft from lead authors to meeting participants and Party peer review	21 October
Second peer review	Comments on the ten-page summary from peer reviewers to the Secretariat	21 November

VII. CLOSING

49. The Chair thanked participants for their time and commitment, with a special thanks to the Royal Society for providing a computer and publications for the meeting, and to the Secretariat of the Convention on Biological Diversity for preparing the background documents.

50. The meeting closed at 5:45 p.m. on Friday, 1 July 2011.

Annex I

Programme

29 June		
1 p.m. – 2 p.m.	Registration of participants	
2 p.m. – 2:30 p.m.	Opening of the meeting	- Welcome - Introduction of participants - Agreement on the work plan
2:30 p.m. – 3:30 p.m.	Defining geo-engineering	- Review of existing definitions of climate-related geo-engineering[6]
3:30 p.m. – 4 p.m.	Coffee break	
4 p.m. – 6 p.m.	Defining geo-engineering (cont.)	- Drafting of proposal on a definition of climate-related geo-engineering
30 June		
9 a.m. – 11 a.m.	Assessing the potential impacts of climate-related geo-engineering on biodiversity	- Literature review on the potential impacts of climate-related geo-engineering on biodiversity[7]
11 a.m. – 11:30 a.m.	Coffee break	
11:30 a.m. – 1 p.m.	Assessing the potential impacts of climate-related geo-engineering on biodiversity (cont.)	- Methodologies for assessing potential impacts of climate-related geo-engineering on biodiversity
1 p.m. – 2 p.m.	Lunch	
2 p.m. – 3:30 p.m.	Assessing the potential impacts of climate-related geo-engineering on biodiversity (cont.)	- Gaps in information and possible ways to fill such gaps / manage for uncertainties
3:30 p.m. – 4 p.m.	Coffee break	
4 p.m. – 6 p.m.	Assessing the potential impacts of climate-related geo-engineering on biodiversity (cont.)	- Categorization of potential impacts of climate-related geo-engineering on biodiversity (geographic scale, time scale, etc)
6:30 p.m.	Reception dinner (at IMO, 4th floor)	
1 July		
9 a.m. – 11 a.m.	Drafting of guidance	- Overview of known or expected impacts of climate-related geo-engineering on biodiversity
11 a.m. – 11:30 a.m.	Coffee break	
11:30 a.m. – 1 p.m.	Drafting of guidance (cont.)	- Process for assessing impacts of climate-related geo-engineering on biodiversity

[6] Background document prepared by the Secretariat

[7] Background document prepared by the Secretariat

1 p.m. – 2 p.m.	Lunch	
2 p.m. – 3:30 p.m.	Drafting of guidance (cont.)	- Process for assessing impacts of climate-related geo-engineering on biodiversity
3:30 p.m. – 4 p.m.	Coffee break	
4 p.m. – 6 p.m.	Next steps and closing	- Identification of tasks - Establishment of timeline for work - Closing of the meeting

Annex II

List of Participants

CBD Parties

Brazil

1. Mr. Ricardo Melamed
Ministry of Science and Technology
Esplanada dos Ministerios
Bloco E
Brasilia
Brazil
Tel.: 61-3317-8111
E-Mail: RMELAMED@MCT.GOV.BR

Ethiopia

2. Dr. Tewolde Berhan Gebre Egziabher
Director General
Environmental Protection Authority
P.O. Box 12760
Addis Ababa
Ethiopia
Tel.: +251 11 646 4606
Fax: +251 11 646 4882, +251 11 646 4876
E-Mail: esid@ethionet.et

European Union

3. Ms. Karin Zaunberger
Policy Officer for Biodiversity
DG Environment
European Commission
Avenue de Beaulieu 5
Brussels B-1049
Belgium
Tel.: +322 2 296 2172
Fax: +322 2 296 8824
E-Mail: karin.zaunberger@ec.europa.eu
Web: http://ec.europa.eu/

Nigeria

4. Ms. Chizoba Chinweza
Research Fellow/Chief Consultant
Chemtek Associates
4a Maye Street off Montgomery Road
Yaba, Lagos
Nigeria
Tel: +2348033015717
E-Mail: ud2001ng@yahoo.com

Norway

5. Mr. Oyvind Christophersen
Senior Adviser
Section for Climate and Energy
Climate and Pollution Agency
Norway
E-Mail: oyvind.christophersen@klif.no

Paraguay

6. Mr. Miguel Lovera
President of SENAVE
Servicio Nacional de Calidad y Sanidad Vegetal y de Semillas
Edif. PLANETA I. Humaitá Nº 145 c/ Ntra. Sra. de la Asunción
Asunción
Paraguay
E-Mail: lovera2@conexion.com.py

Russian Federation

7. Mr. Dmitry Zamolodchikov
Deputy Director
Forest Ecology and Production Center
Russian Academy of Sciences
ul. Profsouznaya, 84/32
Moscow 117997
Tel.: 7-499-743-00-26
Fax: 7-499-743-00-16
E-Mail: dzamolod@mail.ru, dzamolod@cepl.rssi.ru

United Kingdom of Great Britain and Northern Ireland

8. Dr. Chris Vivian
National Marine Advisor
Centre for Environment, Fisheries and Aquaculture Science
Department for Environment, Food and Rural Affairs
Lowestoft Laboratory
Pakefield Road
Lowestoft NR33 0HT
United Kingdom of Great Britain and Northern Ireland
Tel.: 016 2178 3972
Fax: 015 0251 3865
E-Mail: Chris.Vivian@cefas.co.uk

9. Prof. Robert Watson
Chief Scientific Advisor
Department of Environment, Food and Rural Affairs
Nobel House
17 Smith Square
London SW1P 3JR
United Kingdom of Great Britain and Northern Ireland
Tel.: 44(0)2072381645
E-Mail: Robert.Watson@defra.gsi.gov.uk

10. Dr. Ana Delgado
International Biodiversity Policy Unit
Department of Environment, Food and Rural Affairs
United Kingdom of Great Britain and Northern Ireland
Tel.: +44 (0) 20 7238 1184
E-Mail: ana.delgado@defra.gsi.gov.uk

Non-Governmental Organizations

Biofuelwatch

11. Mrs. Almuth Ernsting
Biofuelwatch
10 Talisman Drive
Aberdeen AB10 7EX
United Kingdom of Great Britain and Northern Ireland
Tel.: +44 (0)1224 324797
E-Mail: almuth@ernsting.wanadoo.co.uk, info@biofuelwatch.org.ok

EcoNexus

12. Ms. Helena Paul
Co-Director
EcoNexus
11 Pandora Road
London NW6 1TS
United Kingdom of Great Britain and Northern Ireland
Tel.: +44 207 431 4357
E-Mail: h.paul@econexus.info

International Biochar Initiative

13. Dr. Ronal W. Larson
International Biochar Initiative
21758 Mountsfield Drive
Golden CO 80401
United States of America
Tel.: 303 526 9629
E-Mail: rongretlarson@comcast.net

The Royal Society

14. Mr. Andrew Parker
Senior Policy Adviser
Science Policy Centre
The Royal Society
6- 9 Carlton House Terrace
London SW1Y 5AG
United Kingdom of Great Britain and Northern Ireland
Tel.: +44 20 7451 2590
Fax: +44 20 7925 2620
E-Mail: andrew.parker@royalsociety.org
Web: http://royalsociety.org

15. Ms. Emma Woods
The Royal Society
6- 9 Carlton House Terrace
London SW1Y 5AG
United Kingdom of Great Britain and Northern Ireland
E-Mail: emma.woods@royalsociety.org
Web: http://royalsociety.org

Education/University

Colby College

16. Prof. James Rodger Fleming
Professor and Director
STS Program
Colby College
5881 Mayflower Hill
Waterville Maine 04901-8858
United States of America
Tel.: 2078595881
E-Mail: jfleming@colby.edu

Imperial College London

17. Dr. Georgina Mace
Professor
Centre for Population Biology
Imperial College London
Silwood Park
Ascot Berks, SL5 7PY
United Kingdom of Great Britain and Northern Ireland
Tel.: +44 2075942354
E-Mail: g.mace@imperial.ac.uk

University of East Anglia

18. Dr. Phillip Williamson
School of Environmental Sciences
University of East Anglia
Norwich NR4 7TJ
United Kingdom of Great Britain and Northern Ireland
Tel.: 441603593111
E-Mail: p.williamson@uea.ac.uk

University of Edinburgh

19. Mr. Stephen Salter
Emeritus Professor of Engineering Design Institute for Energy Systems
School of Engineering
University of Edinburgh
Mayfield Road
Edinburgh EH9 3JL
United Kingdom of Great Britain and Northern Ireland
Tel.: 44 131 650 5704
E-Mail: S.Salter@ed.ac.uk

University of Oxford

20. Mr. Tim Kruger
James Martin Fellow
Oxford Geoengineering Programme
Oxford Martin School
University of Oxford
United Kingdom of Great Britain and Northern Ireland
E-Mail: tim.kruger@oxfordmartin.ox.ac.uk

University of São Paulo

21. Prof. Paulo Artaxo
Professor
Institute of Physics
University of São Paulo
Sao Paulo
Brazil
Tel.: +551130917016
Fax: +551130916647
E-Mail: artaxo@if.usp.br
Web: http://www.usp.br

University of Stockholm

22. Dr. Victor Galaz
Theme Leader Multi-level Adaptive Governance, Learning/Knowledge
Stockholm Resilience Centre
University of Stockholm
10691
Sweden
E-Mail: victor.galaz@stockholmresilience.su.se

SCBD

Secretariat of the Convention on Biological Diversity

23. Ms. Jaime Webbe
Programme Officer, dry and sub-humid lands
Secretariat of the Convention on Biological Diversity
413, Saint-Jacques Street W.
Suite 800
Montreal Quebec
Canada
Tel.: 5142878718
E-Mail: jaime.webbe@cbd.int
Web: www.cbd.int

24. Ms. Annie Cung
Programme Assistant
Scientific, Technical and Technological Matters
Secretariat of the Convention on Biological Diversity
413, Saint-Jacques Street W.
Suite 800
Montreal Quebec
Canada
Tel.: 1-514-287-7045
E-Mail: annie.cung@cbd.int
Web: www.cbd.int
