UNEP

CBD

Convention on Biological Diversity

Distr.
GENERAL

UNEP/CBD/SBSTTA/16/13
23 January 2012

ORIGINAL: ENGLISH

SUBSIDIARY BODY ON SCIENTIFIC,
TECHNICAL AND TECHNOLOGICAL ADVICE
Sixteenth meeting
Montreal, 30 April – 5 May 2012
Item 10 of the provisional agenda*

NEW AND EMERGING ISSUES RELATING TO THE CONSERVATION AND SUSTAINABLE USE OF BIOLOGICAL DIVERSITY

Note by the Executive Secretary

EXECUTIVE SUMMARY

In response to decisions IX/29 and X/13 of the Conference of the Parties, on new and emerging issues for possible consideration within the Convention process, submissions were received from eight proponents providing additional evidence on the relevance for the Convention on Biological Diversity of geo-engineering, synthetic biology and ground-level ozone, as well as suggesting deep-sea fishing and climate change in coastal and offshore zones for inclusion on the agenda of a future meeting of the Subsidiary Body on Scientific, Technical and Technological Advice. Two Parties responded to the invitation to provide views and comments on these proposals: one Party did not consider any of the issues as fulfilling the criteria set out in decision IX/29; while another called for the development of guidance under the Convention on synthetic biology. The Secretariat also received a submission on biodiversity and ground-level ozone containing technical information on the impact of ground-level ozone on biodiversity in relation to the criteria from decision IX/29. A summary of that submission is annexed to the present note, and the full text is being made available as an information document (UNEP/CBD/SBSTTA/16/INF/35).

DRAFT RECOMENDATIONS

The Subsidiary Body on Scientific, Technical and Technological Advice may wish adopt a recommendation along the following lines:

The Subsidiary Body on Scientific, Technical and Technological Advice,

Having examined the submissions made in response to the invitation to propose new and emerging issues relating to the conservation and sustainable use of biodiversity;

* UNEP/CBD/COP/SBSTTA/16/1.

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Having discussed the issue of "geo-engineering: impacts on biodiversity and gaps in regulatory mechanisms" under the agenda item on biodiversity and climate change and made separate recommendations on this issue;[1]

Takes note of the technical information on the impact of ground-level ozone on biodiversity contained in the annex to this note;

Recommends that the Conference of the Parties adopts a decision along the following lines:

The Conference of the Parties

Takes note of the proposals for new and emerging issues relating to the conservation and sustainable use of biodiversity;

1. Option 1. [*Decides* not to add any of the proposed new and emerging issues relating to the conservation and sustainable use of biodiversity to the agenda of the Subsidiary Body on Scientific, Technical and Technological Advice;]

Option 2. [*Recognizing* the potential impacts of products derived from synthetic biology on the conservation and sustainable use of biodiversity, *requests* the Executive Secretary to compile and synthesize available scientific information, and views and experiences of indigenous and local communities and other stakeholders, on the possible impacts of synthetic biology techniques and products on biodiversity and associated social, economic and cultural considerations, and options on definitions and understandings of synthetic biology relevant to the Convention on Biological Diversity and make it available for consideration at a meeting of the Subsidiary Body on Scientific, Technical and Technological Advice prior to the twelfth meeting of the Conference of the Parties;]

2. *Noting* the effects of tropospheric ozone as a greenhouse gas and the significant potential contribution of its reduction in mitigating climate change, *noting also* its impacts on human health and on biodiversity, *decides* to include the consideration of the impacts of tropospheric ozone in the programme of work on the interlinkages of biodiversity and climate change and *requests* the Executive Secretary to report on progress to a future meeting of the Subsidiary Body on Scientific, Technical and Technological Advice where biodiversity and climate change is on the agenda;

3. *Noting* that overfishing, including deep-sea fishing, illegal, unreported and unregulated (IUU) fishing as well as the impacts of bottom fishing on vulnerable marine ecosystems and the long-term sustainability of deep-sea fish stocks fall within scope of the programme of work on marine and coastal biodiversity, *requests* the Executive Secretary to ensure that the consideration of deep-sea fishing is addressed in the ongoing and future activities under the programme of work on marine and coastal biodiversity;

4. *Noting* that climate change in coastal and offshore zones falls within scope of the programmes of work on marine and coastal biodiversity and on the interlinkages between biodiversity and climate change, *requests* the Executive Secretary to ensure that the consideration of climate change in coastal and offshore zones is addressed in the ongoing and future activities under these programmes of work;

[1] The note by the Executive Secretary on the impacts of geo-engineering: on biodiversity and gaps in regulatory mechanisms (UNEP/CBD/SBSTTA/16/10) will be discussed under agenda item 7.3, drawing on the studies on the impacts of climate-related geo-engineering on biodiversity and on the regulatory framework of climate-related geo-engineering relevant to the Convention on Biological Diversity.

I. INTRODUCTION

1. In decision IX/29, the Conference of the Parties provided guidance on the procedure for the identification of new and emerging issues and on the review of proposals, specified the kind of information that should be provided in support of a proposal and listed criteria that should be applied in evaluating the proposals.

2. Through the same decision, the Executive Secretary was requested to invite Parties and relevant organizations after each meeting of the Conference of the Parties to submit proposals for new and emerging issues and to compile these in the form in which they are received. Parties and relevant organizations should then be notified of the opportunity to contribute relevant information and views related to the proposals taking into account the criteria and the Executive Secretary was requested to prepare a document compiling the original submissions and the information and views received for consideration by the Subsidiary Body on Scientific, Technical and Technological Advice.

II. PROPOSALS FOR NEW AND EMERGING ISSUES

3. In decision X/13, the Conference of the Parties, while deciding that none of the proposed new and emerging issues relating to the conservation and sustainable use of biodiversity should be added to the agenda of the Subsidiary Body on Scientific, Technical and Technological Advice, recognized that the issues of ocean acidification, Arctic biodiversity, ocean noise, and ground-level ozone met the criteria set out in decision IX/29.

4. Accordingly, the Conference of the Parties decided to, *inter alia*:

(a) Consider the impacts of ocean acidification on marine biodiversity and habitats as part of the ongoing activities under the programme of work on marine and coastal biological diversity;

(b) Take into account, in the implementation of the programmes of work on protected areas and on marine and coastal biodiversity, the impact of ocean noise on marine protected areas and to consider the scientific information on underwater noise and its impacts on marine and coastal biodiversity and habitats called for in paragraph 12 of decision X/29, on marine and coastal biodiversity;

(c) Invite the Arctic Council to provide relevant information and assessments of Arctic biodiversity;[2]

(d) Invite Parties, other Governments and relevant organizations to submit information on synthetic biology and geo-engineering;

(e) Request the Executive Secretary to invite relevant organizations to submit, in accordance with the procedures of decision IX/29, technical information on the impact of ground-level ozone on biodiversity and compile this information and report to the Subsidiary Body at a meeting prior to the eleventh meeting of the Conference of the Parties so as to facilitate consideration of the available scientific information concerning the impact of ground-level ozone on biodiversity.

5. In accordance with these provisions, Parties and relevant organizations were invited, through notification SCBD/STTM/JM/RH/VA/74761 (2011-013) dated 19 January 2011, to submit proposals on new and emerging issues relating to the conservation and sustainable use of biodiversity and to provide

[2] The issue of Arctic biodiversity was taken up by the Subsidiary Body at its fifteenth meeting and the outcome of its consideration of the matter is contained in SBSTTA recommendation XV/7.

further information on some proposals received prior to the fourteenth meeting of the Subsidiary Body. The deadline for submissions was 15 October 2011. The following submissions have been received:

Submissions	Proposed issue(s)
Mexico	No new and emerging issue at this time
Friends of the Earth	Synthetic Solutions to the Climate Crisis: The Dangers of Synthetic Biology for Biofuels Production https://www.cbd.int/doc/emerging-issues/foe-synthetic-biology-for-biofuels-2011-013-en.pdf
EcoNexus	Synthetic Biology https://www.cbd.int/doc/emerging-issues/econexus-synthetic-biology-2011-013-en.pdf
ETC Group	Extreme Genetic Engineering: An Introduction to Synthetic Biology https://www.cbd.int/doc/emerging-issues/etcgroup-introduction-synthetic-biology-2011-013-en.pdf
ETC Group	The New Biomassters: Synthetic Biology and the Next Assault on Biodiversity and Livelihoods https://www.cbd.int/doc/emerging-issues/etcgroup-biomassters-2011-013-en.pdf
ETC Group	Extract on Synthetic Biology from Forthcoming Report "Who Will Control the Green Economy" https://www.cbd.int/doc/emerging-issues/etcgroup-synthetic-biology-2011-013-en.pdf
ETC Group	Geopiracy: The Case Against Geoengineering https://www.cbd.int/doc/emerging-issues/etcgroup-geopiracy-2011-013-en.pdf
International Civil Society Working Group on Synthetic Biology	Potential Impacts of Synthetic Biology on the Conservation and Sustainable Use of Biodiversity https://www.cbd.int/doc/emerging-issues/Int-Civil-Soc-WG-Synthetic-Biology-2011-013-en.pdf
L.D. Emberson et al.	Biodiversity and Ground-level Ozone https://www.cbd.int/doc/emerging-issues/Emberson-et-al-Biodiversity-and-Ground-level-Ozone-2011-013-en.pdf
Brazil	Deep sea fishing https://www.cbd.int/doc/emerging-issues/Brazil-submission%202011-013-en.pdf
Brazil	Climate change in coastal and offshore zones https://www.cbd.int/doc/emerging-issues/Brazil-submission%202011-013-en.pdf
United Kingdom	Synthetic biology: scope, applications and implications http://www.raeng.org.uk/societygov/policy/current_issues/synthetic_biology/pdf/Synthetic_biology.pdf

6. The submissions were made available on the CBD web page at http://www.cbd.int/emerging/ as soon as they were received, along with hyperlinks giving access to the underlying material.

7. The submissions on geo-engineering were taken into account in the preparation of the studies on the impacts of climate-related geo-engineering on biodiversity and on the Regulatory framework of climate-related geo-engineering relevant to the Convention on Biological Diversity, undertaken in response to the request in decision X/33, to compile and synthesize available scientific information, and views and experiences of indigenous and local communities and other stakeholders, on the possible

impacts of geo-engineering techniques on biodiversity and associated social, economic and cultural considerations, and options on definitions and understandings of climate-related geo-engineering relevant to the Convention on Biological Diversity and make it available for consideration at a meeting of the Subsidiary Body on Scientific, Technical and Technological Advice prior to the eleventh meeting of the Conference of the Parties. The impacts of geo-engineering on biodiversity and gaps in regulatory mechanisms are addressed in separate note by the Executive Secretary (UNEP/CBD/SBSTTA/16/10) for discussion under agenda item 7.3 (Geo-engineering: impacts on biodiversity and gaps in regulatory mechanisms).

III. APPLICATION OF CRITERIA TO THE PROPOSED NEW AND EMERGING ISSUES

8. Through notification SCBD/STTM/JM/RH/VA/74761 (2011-204) dated 27 October 2011, Parties, other Governments and relevant organizations were invited to comment, by 20 January 2012, on these proposals, applying the criteria listed in paragraph 12 of decision IX/29.

9. As of 24 January 2012, two sets of comments had been received, as follows:

Comment	Date	Summary conclusion
Mexico	20-Jan-12	None of the proposals fulfils the criteria established through decision IX/29. It is important to ensure that these criteria are fulfilled to enable SBSTTA to make appropriate recommendations based on scientific considerations.
Grenada	24-Jan-12	Synthetic biology should be considered as an emerging issue; it poses a risk to biological diversity and presents new challenges with regards to the fair and equitable sharing of benefits arising from the utilization of genetic resources. Grenada does not have the capacity to determine risks associated with synthetic biology (including to the agriculture and tourism sectors) and relies on CBD for guidance. Grenada further recognizes that geo-engineering is a rapidly developing area and there is a need for it to be regulated under the Convention.

IV. COMPILATION OF INFORMATION ON THE IMPACT OF GROUND-LEVEL OZONE ON BIODIVERSITY

10. In paragraph 7 of decision X/13, the Conference of the Parties requested the Executive Secretary to invite relevant organizations to submit, in accordance with the procedures of decision IX/29, technical information on the impact of ground-level ozone on biodiversity and compile this information and report to the Subsidiary Body at a meeting prior to the eleventh meeting of the Conference of the Parties so as to facilitate consideration of the available scientific information concerning the impact of ground-level ozone on biodiversity.

11. The submission on biodiversity and ground-level ozone, which was prepared in response to this call, applies the criteria contained in decision IX/29 to enable the Subsidiary Body to consider the available scientific information concerning the issue, so as to facilitate a recommendation. It is reproduced in the compilation of submissions received (UNEP/SCBD/SBSTTA/16/INF/35) and a summary is annexed to the present note with a view to facilitating the consideration of this issue by the Subsidiary Body. It can also serve as a useful example of how the criteria contained in paragraph 12 of decision IX/29 could be applied to a proposed issue.

Annex

COMPILATION OF INFORMATION ON THE IMPACT OF GROUND-LEVEL OZONE ON BIODIVERSITY

This annex is a summary of technical information from the note by the Executive Secretary on new and emerging issues relating to the conservation and sustainable use of biological diversity (UNEP/SCBD/SBSTTA/16/INF/35) providing information on the impact of tropospheric or ground-level ozone (O_3) on biodiversity and its relevance to the key criteria agreed by the Conference of the Parties in paragraph 12 of decision IX/29. More detail and full reference citations are contained in the above-mentioned information document.

Tropospheric ozone (O_3) or ground-level ozone[3] is a global, secondary air pollutant impacting human health and ecosystems, and an important greenhouse gas. Tropospheric ozone is formed in the lowest portion of the earth's atmosphere by the chemical reaction between sunlight and air containing volatile organic compounds, which are released by motor vehicles and industry. It can damage vegetation, and cause significant reduction in the growth of some plant species and reductions in agricultural yields through its interference with photosynthesis. Tropospheric ozone is a phenomenon that is distinct from stratospheric ozone which is not considered in the scope of this document.

Despite geographic variability of data, studies have shown that O_3 could be causing substantial damage to biodiversity and associated ecosystem services. Current O_3 concentrations are considerably higher in the Northern Hemisphere than the Southern Hemisphere and affected by seasonality, peaking in spring. Reducing pollutants such as tropospheric ozone is addressed in most thematic programmes of work as well as in Target 8 of the Strategic Plan for Biodiversity ("By 2020, pollution, including from excess nutrients, has been brought to levels that are not detrimental to ecosystem function and biodiversity").

The harmful effects of ground-level O_3 to vegetation include effects on photosynthetic carbon assimilation, stomatal conductance, and plant growth. Recent meta-analyses comparing Northern temperate trees exposed to current ambient concentrations of O_3 compared to charcoal-filtered air suggest that O_3 is currently decreasing net photosynthesis of trees by 11% and causing a 7% decrease in tree biomass. Since forest vegetation and soils store more than 50% of terrestrial carbon, the negative effects of O_3 on forest productivity have implications both for biodiversity as well as for the global carbon cycle and climate change. Enhanced atmospheric O_3 concentrations caused by reductions in the vegetative sink strength may also have implications to human health.

Predicting the response of grasslands to O_3 is complex and depends on sensitivities of individual species, their mutualistic and competitive interactions, as well as specific microclimatic conditions. While experiments have documented that elevated O_3 decreases grassland productivity, other experiments with established temperate, calcareous and alpine grasslands have shown that net primary productivity (NPP) of these systems is relatively resilient to rising O_3. Ozone also produces more subtle changes in carbon assimilation, leaf longevity, and biomass partitioning of grassland species, suggesting that grassland productivity may decline in the longer term in response to O_3.

Plant response to O_3 is modified by other environmental changes that stress plant systems, including atmospheric CO_2 concentrations, **temperature, pollution, precipitation (or soil moisture availability) and nitrogen availability,** although significant gaps in knowledge remain about the

[3] The terms "tropospheric ozone" and "ground-level ozone" are used interchangeably for the purposes of this document. "Low-level ozone" is another term sometimes used to refer to the same phenomenon.

interaction of rising tropospheric O_3 and other environmental factors. Generally, CO_2 stimulates photosynthesis, leaf and root litter production, while O_3 damages photosynthetic tissues and accelerates leaf senescence. Atmospheric CO_2 concentrations and O_3 concentrations also have the potential to alter nitrogen (N) cycling in forest ecosystems through influences on plant growth and litter production. A doubling of CO_2 concentration was estimated to increase O_3 concentration over parts of Europe, Asia and the Americas by 4-8 parts per billion (ppb) during the crop-growing season.

There is increasing evidence that O_3 could have significant adverse effects on communities of high conservation value. Although information is still too limited to provide clear conclusions on where ozone may pose the greatest threat to achieving targets for protection of biodiversity, there is experimental evidence to demonstrate that relatively low concentrations of O_3 can have effects that would reduce habitat conservation value. For example, in summary table 1 (in information document), the European threshold for adverse effects of O_3 is exceeded over a significant proportion of United Kingdom woodland and grassland habitats.

Since the Industrial Revolution, O_3 has had a significant negative impact on terrestrial NPP, which has important implications for terrestrial carbon storage and global radiative forcing. As a result of global climate change and increased atmospheric CO_2 concentration in the future, temperatures will increase and precipitation will change, and both are important determinants of stomatal conductance, NPP and uptake of O_3. However, significant gaps in knowledge remain about the interactions of rising tropospheric O_3 with climate change and associated factors. While tropospheric O_3 is a driver of global warming, other climate changes over the next century have the potential to influence future O_3 by modifying the rates of O_3 production and destruction in the atmosphere and at the Earth's surface.

Interactions between climate change and ground-level O_3 on the prevalence of secondary stresses, such as pests and diseases, should be considered. Future climate change is predicted to affect the incidence of pests and diseases, and O_3 can mediate parasite-host interactions by causing toxicity to the secondary stressor or by affecting the abundance and quality of the host plant. Since insect herbivores are frequently limited by N availability, interactions may also occur with increased N deposition to N limited ecosystems. Additionally, rising atmospheric CO_2 concentrations may increase plant productivity at the expense of foliar N concentrations and may increase production of C based allelochemicals, both reducing the quality of the host plant. Unfortunately, data for specific pest, disease and plant species competition interactions are often controversial complicating efforts to project parasite-host interactions under future environmental change.

The evidence for negative effects of O_3 on fodder production is relatively strong, but it may depend on the type of plant community. In high productivity - low diversity systems, significant losses in fodder production have been observed, although resistant species may benefit from the loss of more sensitive species, compensating for the decline. A shift in plant species composition may have implications for both conservation and fodder quality. O_3 can also reduce digestibility and nutritive food value of crops though metabolic processes. These changes are likely to be species-dependent, particularly in legumes adapted to a warm season and in C_4 grasses.

The lack of international efforts to control O_3 precursor emissions means that many ecosystems are completely unprotected from this strongly phyto-toxic pollutant. Mitigation of O_3 precursor emissions (predominantly nitrogen oxides, carbon monoxide and volatile organic compounds including methane) requires changes in industrial, domestic and transport related emissions, often as part of international emission reduction programmes since O_3 is a transboundary pollutant. Importantly, the only world region that is making any concerted effort to control O_3 concentrations to limit vegetation damage is Europe through work under the Convention on Long Range Transboundary Air Pollution of the United Nations Economic Commission for Europe (UNECE) and various EU legislative directives. However,

thresholds and targets set by these bodies are exceeded in many locations across Europe with the likelihood that damage to vegetation resulting from O_3 exposures will be occurring across the region.

Effects on key ecosystems services will indirectly affect human well-being. There is some evidence that the cultural amenity value of conservation sites may be affected as O_3 can impact species of high conservation value. There may also be implications to human health resulting from enhanced atmospheric O_3 concentrations caused by reductions in the vegetative sink strength. Such reductions can occur as O_3 causes enhanced water loss from the system, drying the soil and leading to a more rapid occurrence of water stress; this will cause the stomata to close reducing O_3 dry deposition and leading to a build up of atmospheric O_3 concentrations which may impact human health.

Estimates of future O_3 vary widely depending on emissions and legislation scenarios, and are strongly dependent on global and regional emission pathways. Experimental and modelling approaches are currently being used to understand plant responses to elevated O_3. Using varying O_3 emission scenarios, estimates from 6 global models of mean surface O_3 concentration between 2000 and 2050, show the greatest increases in South Asia up to 5 ppb. The results suggest changes in surface O_3 by 2030 over North America and Europe ranging from changes of about 1 ppb (worst case) to reductions of about 5 ppb in the cleaner scenario. The urgency to take action to mitigate for O_3 impacts on biodiversity depends on which of these pathways is followed.

Figure 1. Mean surface O_3 changes over polluted regions of the northern hemisphere following the four representative concentration pathways (RCP) scenarios from 2000 to 2050, for further details see HTAP, 2010.