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联合国教育、
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Culture Sector

ACTION J. Scanlon COPY

10 FEB 2011

M. John Scanlon
Secretary-General
Convention on International Trade in Endangered Species of Wild Fauna and Flora
International Environment House
Chemin des Anémones
CH-1219 Châtelaine, Geneva
Switzerland

04 February 2011

Ref.: CLT/WHC/SPU/11/070

Subject: World Heritage activities linked to climate changes and CITES

Dear ~~Mr Scanlon~~ John,

In reply to your letter of 21 December last, I am happy to provide you some information on the Climate Change related activities implemented by the World Heritage Centre.

The World Heritage Committee at its 29th session (Durban, 2005) requested that the World Heritage Centre convene a broad working group of experts to review the nature and scale of risks arising from climate change to World Heritage sites and prepare a strategy for dealing with this issue. The corresponding developed strategy was endorsed by the Committee at a subsequent session (Christchurch, 2007). Furthermore, a policy document on the impacts of climate change was developed and discussed by the 16th General assembly of the States Parties to the World Heritage Convention (Paris, 2007). The World Heritage Centre also prepared a publication with several case studies. All these publications are available on our website, under the page related to climate change (http://whc.unesco.org/en/activities/&pattern=&search_theme=23). I also enclose copies of the relevant decisions of the World Heritage Committee and General Assembly.

In follow-up to the strategy, the World Heritage Centre is planning to implement it by developing a number of pilot projects in World Heritage sites across the world. The objective is to increase the resilience of World Heritage sites to climate change, monitor climate change impacts and strive to set up pilot carbon-financed forest protection measures in the buffer zones and forest corridors. We also plan to further research the impacts of climate change on the network of World Heritage sites. However, as the Committee has not aside specific funding for these initiatives, we need to mobilise extrabudgetary resources and partners to pursue these initiatives.

.../...

7, place de Fontenoy
75352 Paris 07 SP, France
Tél. : +33 (0)1 45 68 15 72
Fax : +33 (0)1 45 68 55 70

www.unesco.org

I hope that this provides the information you need to respond to the query of the CITES Animals and Plants Committees. We remain available to provide additional details if needed.

Yours sincerely,

Kishore Rao
Deputy Director Programmes
UNESCO World Heritage Centre

Enc. Copies of relevant decisions of the General Assembly and World Heritage Committee

Decision - 31COM 7.1 - Issues relative to the state of conservation of world heritage properties : the impacts of climate change on world heritage properties

The World Heritage Committee,

1. Having examined Document WHC-07/31.COM/7.1,

2. Recalling Decision 30 COM 7.1 adopted at its 30th session (Vilnius, 2006),

3. Thanks the Government of the Netherlands for having funded the development of the policy document on the Impacts of Climate Change on World Heritage Properties, including a meeting of the Working Group of Experts, (5 - 6 February 2007 at UNESCO Headquarters, Paris), and also thanks the experts and representatives of organizations who contributed to the meeting;

4. Endorses the "Policy Document on the Impacts of Climate Change on World Heritage Properties" as described in Document WHC-07/31.COM/7.1, and decides to authorize the Chairperson of the Committee to vet the Policy Document, incorporating views expressed at the 31st session, and, as appropriate, to consult Committee members by email and other means;

5. Decides to transmit the revised Policy Document for discussion and adoption at the 16th General Assembly of States Parties in 2007;

6. Recommends that the Policy Document be read in conjunction with the report on "Predicting and managing the impacts of Climate Change on World Heritage" and the "Strategy to assist States Parties to implement appropriate management responses" - endorsed by the Committee at its 30th session (Vilnius, 2006) - together with other relevant conventions such as the Convention on Biological Diversity and the Convention to Combat Desertification, and other UNESCO initiatives, and further thanks the Government of Spain for supporting their publication as World Heritage Paper No. 22;

7. Urges the World Heritage community to integrate actions pertaining to climate change in risk preparedness policies and action plans, making use thereby of the Policy Document and the Strategy for Risk Reduction at World Heritage properties, so as to protect their outstanding universal value, authenticity and/or integrity.

8. Also urges States Parties to participate in the United Nations Climate Change conferences with a view to achieving a comprehensive post-Kyoto agreement, and to fund and support the research needs as identified in Annex 1 of the Policy Document;

9. Encourages the World Heritage Centre to sensitize States Parties, as appropriate, to the need to establish inter-disciplinary mechanisms to deal with policy and governance issues relating to the effect of climate change on World Heritage properties;

10. Recommends that the World Heritage Centre strengthen its relations with all organizations working on climate change, particularly with the UNFCCC

and IPCC secretariats, and specifically with regard to the effect of climate change on World Heritage properties;

11. Welcomes the excellent publication on "Case Studies on Climate Change and World Heritage" and thanks the United Nations Foundation (UNF) and the Government of the United Kingdom for having supported its production;

12. Encourages UNESCO and the Advisory Bodies to disseminate widely the Policy Document, and other related publications through appropriate means to the World Heritage community and the broader public, and promote their application;

13. Adopts the specific research priorities indicated in the Policy Document and recommends to the UNESCO Forum - Universities and Heritage to prioritize these subjects and to open discussions on the effects of climate change on World Heritage properties;

14. Requests the World Heritage Centre and the Advisory Bodies to develop in consultation with States Parties criteria for the inclusion of those properties which are most threatened by climate change on the List of World Heritage in Danger, for use in prioritizing vulnerability assessment, mitigation and adaptation activities;

15. Decides, for future sessions of the World Heritage Committee, to add to the working document on State of Conservation reporting, a section on those properties most affected by climate change;

.16. Commends the Government of New Zealand for making the 31st session "carbon neutral" and adopts a carbon neutral policy for all future sessions, to the extent feasible.

Resolution: 16 GA 10

The General Assembly,

1. Having examined Document *WHC-07/16.GA/10,*

2. Recalling Decisions **30 COM 7.1** and **31 COM 7.1**, adopted respectively at the 30th (Vilnius, 2006) and 31st (Christchurch, 2007) sessions of the World Heritage Committee,

3. Taking into account the relevant issues identified in the recent Thematic Debate of the Executive Board on UNESCO's role in addressing climate change within its mandated areas of competence and also noting the upcoming meetings on climate change in Bali in December 2007 (Thirteenth session of the Conference of the Parties to the UNFCCC (COP 13) and the third meeting of the Parties to the Kyoto Protocol (CMP 3), Bali, Indonesia, 3 to 14 December 2007) and in Denmark in 2009 (Fifteenth session of the Conference of the Parties of the UNFCCC (COP 15) and the fifth meeting of the Parties to the Kyoto Protocol (CMP 5), Copenhagen, Denmark, 30 November 2009 - 11 December 2009);

4. Adopts the "Policy Document on the Impacts of Climate Change on World Heritage Properties" and strongly recommends its use by all concerned, together with the report on "Predicting and Managing the impacts of climate change on World Heritage" and the "Strategy to Assist States Parties to Implement Appropriate Management Responses" contained in World Heritage Paper No: 22;

5. Encourages UNESCO and the Advisory Bodies to disseminate widely the Policy Document, the Report and Strategy, referred to in paragraph 2 above, and other relevant publications to all concerned, including the general public, and promote their application;

6. Requests the World Heritage Committee to institute a mechanism for the World Heritage Centre and the Advisory Bodies to periodically review and update the Policy Document, and other related documents, so as to make available the most current knowledge and technology on the subject to guide the decisions and actions of the World Heritage community.

7. Urges the States Parties to participate in the United Nations climate change conferences with a view to achieving a comprehensive post-Kyoto agreement, and to fund and support the research needs as identified in the adopted Policy document.

8. Further requests the Director-General and the World Heritage Committee to strengthen its relations with all organizations working with climate change particularly the United Nations Framework Convention on Climate Change (UNFCCC) and Intergovernmental Panel on Climate Change (IPCC) secretariats, and specifically with regards to the effect of climate change on World Heritage properties, with a view to delivering as one UN.

Convention on Biological Diversity

INTERNATIONAL YEAR OF FORESTS • 2011

Ref.: SCBD/STTM/JW/ac/74641

16 February 2011

Dear Mr. Scanlon,

Reference is made to your letter dated 21 December 2010 (ref.: JES/DHM/VEZ) in which you request information on activities that may be linked to climate change and CITES.

As such, I am pleased to provide you with the attached summary of activities related to biodiversity and climate change in the context of the Convention on Biological Diversity.

If you would like more information on this topic, do not hesitate to communicate with Ms. Jaime Webbe (email: jaime.webbe@cbd.int, tel: +514-287-8718), the Programme Officer in charge of the cross-cutting issue on biodiversity and climate change.

I look forward to our continued collaboration.

Yours sincerely,

Ahmed Djoghlaf
Executive Secretary

Attachment

Mr. John Scanlon
Secretary-General
CITES
Geneva, Switzerland
Fax: +41 22 797 34 17
Email: John.SCANLON@cites.org

Convention on Biological Diversity

INTERNATIONAL YEAR OF FORESTS • 2011

Secretariat of the Convention on Biological Diversity

Activities related to Biodiversity and Climate Change

Background

At its fifth meeting, the Conference of the Parties (COP) to the CBD highlighted the risks of climate change, in particular, to coral reefs (decision V/3) and to forest ecosystems (decision V/4), and drew attention to the serious impacts of biodiversity loss on these systems and their associated livelihoods. The cross-cutting issue on biodiversity and climate change was included in the work under the Convention in 2004 through decision VII/15 of the Conference of Parties (COP).

In 2001, the Subsidiary Body on Scientific, Technical and Technological Advice (SBSTTA) established an Ad Hoc Technical Expert Group (AHTEG) to carry out an assessment of the interlinkages between biodiversity and climate change. The report of this expert group is published as Technical Series No. 10[1].

At its seventh meeting, the COP encouraged parties to take measures to manage ecosystems so as to maintain their resilience to extreme climate events and to help mitigate and adapt to climate change (decision VII/15). SBSTTA was requested to provide advice or guidance for promoting synergy among activities to address climate change, including activities to combat desertification and land degradation, and activities for the conservation and sustainable use of biodiversity and invited the Conference of the Parties to the Untied Nations Framework Convention on Climate Change (UNFCCC) and to the United Nations Convention to Combat Desertification (UNCCD) to collaborate with the CBD to this end. Hence, in 2006, the AHTEG on Biodiversity and Adaptation to Climate Change produced a Technical Report providing such guidance (Technical Series No. 25[2]).

In 2006, at its eighth meeting, the COP highlighted the importance of integrating biodiversity considerations into all relevant national policies, programmes and plans in response to climate change, and to rapidly develop tools for the implementation of biodiversity conservation activities that contribute to climate change adaptation. The COP also noted the need to identify mutually supportive activities to be conducted by the secretariats of the three Rio Conventions (UNFCCC, UNCCD, and CBD), parties and relevant organizations (decision VIII/30).

At its ninth meeting, the COP, through decision IX/16, established the Second AHTEG on Biodiversity and Climate Change, with a mandate to develop scientific and technical advice on biodiversity, in so far as it relates to climate change and decision 1/CP.13 of the COP of the UNFCCC on the Bali Action Plan as well as its Nairobi work programme on impacts, vulnerability and adaptation to climate change so as to support the enhanced implementation of synergies. The final report of the Second

[1] http://www.cbd.int/doc/publications/cbd-ts-10.pdf
[2] http://www.cbd.int/doc/publications/cbd-ts-25.pdf

AHTEG has been published as Technical Series No. 41[3]. In addition, Technical Series No. 42: Review of the Literature on the Links between Biodiversity and Climate Change – Impacts, Adaptation and Mitigation[4], provided important input to the AHTEG process.

In annex II to decision VIII/10, the Conference of the Parties decided to undertake an in-depth review of the cross-cutting issue at its tenth meeting. The Executive Secretary prepared a note[5] for submission to the Subsidiary Body on Scientific, Technical and Technological Advice (SBSTTA) at its fourteenth meeting based on national reports received and information gathered from organizations and reports submitted under other relevant international processes. The in-depth review revealed that, with regard to the implementation of activities by Parties, the links between biodiversity and climate change are well recognized. There are a number of national and regional studies on impacts and vulnerability. However, when considering the implementation of programmes and activities addressing both climate change and biodiversity, Parties still face a number of obstacles, especially when considering climate change mitigation. A review of implementation of activities revealed good progress with regards to activities to be implemented by the Secretariat alone. However, implementation of activities in collaboration with partners has been limited.

At its tenth meeting, the COP, through decision X/33[6], invited Parties to, *inter alia*:

- address the impacts of climate change on biodiversity, ecosystem services and biodiversity-based livelihoods,
- implement ecosystem-based approaches for adaptation and mitigation, and
- implement activities to increase the adaptive capacity of species and the resilience of ecosystems in the face of climate change.

The COP also requested the Executive Secretary to, *inter alia*:

- convene an expert workshop on reducing emissions from deforestation and forest degradation and the role of conservation, sustainable management of forests and enhancement of forest carbon stocks in developing countries to enhance the coordination of capacity-building efforts on issues related to biodiversity and ecosystem-based carbon sequestration and the conservation of forest carbon stocks,
- compile information on the possible impacts of geo-engineering techniques on biodiversity and undertake a study on gaps in regulatory mechanisms for climate-related geo-engineering relevant to the CBD, and
- convey a proposal to develop joint activities, between the three Rio conventions, to the secretariats of the United Nations Framework Convention on Climate Change and the United Nations Convention to Combat Desertification.

The decision also includes activities for the Executive Secretary to undertake through the Joint Liaison Group of the three Rio conventions.

Resources

Relevant Publications

Technical Series No. 10 – Interlinkages between Biological Diversity and Climate Change - Advice on the integration of biodiversity considerations into the implementation of the United Nations Framework Convention on Climate Change and its Kyoto Protocol (2003).
http://www.cbd.int/doc/publications/cbd-ts-10.pdf

[3] http://www.cbd.int/doc/publications/cbd-ts-41-en.pdf
[4] http://www.cbd.int/doc/publications/cbd-ts-42-en.pdf
[5] http://www.cbd.int/doc/meetings/sbstta/sbstta-14/official/sbstta-14-06-en.pdf
[6] http://www.cbd.int/decision/cop/?id=12299

Technical Series No. 25 - Guidance for Promoting Synergy among Activities Addressing Biological Diversity, Desertification, Land Degradation and Climate Change (2006).
http://www.cbd.int/doc/publications/cbd-ts-25.pdf
Available in English, French and Spanish.

Technical Series No. 41 - Connecting Biodiversity and Climate Change Mitigation and Adaptation: Report of the Second Ad Hoc Technical Expert Group on Biodiversity and Climate Change (2009). http://www.cbd.int/doc/publications/cbd-ts-41-en.pdf

The Key Messages of the Report of the Second Ad Hoc Technical Expert Group on Biodiversity and Climate Change. http://www.cbd.int/doc/publications/ahteg-brochure-en.pdf
Available in English, French, Spanish, Arabic, Chinese, Russian and Japanese.

Technical Series No. 42 - Review of the Literature on the Links between Biodiversity and Climate Change: Impacts, Adaptation and Mitigation (2009).
http://www.cbd.int/doc/publications/cbd-ts-42-en.pdf

Technical Series No. 43 - Forest Resilience, Biodiversity, and Climate Change. A synthesis of the biodiversity/resilience/stability relationship in forest ecosystems (2009).
http://www.cbd.int/doc/publications/cbd-ts-43-en.pdf

Technical Series No. 45 - Scientific Synthesis of the Impacts of Ocean Fertilization on Marine Biodiversity (2009). http://www.cbd.int/doc/publications/cbd-ts-45-en.pdf

Technical Series No. 46 - Scientific Synthesis of the Impacts of Ocean Acidification on Marine Biodiversity (2009). http://www.cbd.int/doc/publications/cbd-ts-46-en.pdf
Available in English and French.

Climate Change Adaptation Database

The Climate Change Adaptation Database gathers information and tools for the integration of biodiversity within adaptation planning from a number of relevant partners. Its purpose is to support Parties as they continue to integrate climate change impacts and response activities through their implementation of the CBD. http://adaptation.cbd.int/

CMS

Convention on the Conservation of Migratory Species of Wild Animals

Secretariat provided by the United Nations Environment Programme

UNEP

Mr. John Scanlon
Secretary-General
CITES Secretariat
International Environment House
Chemin des Anémones
CH-1219 Châtelaine, Geneva
Switzerland

Response to climate change request; your ref: JES/DHM/VEZ

Bonn, 27th May 2011

Dear John,

Thank you for your letter of 21 December 2010 requesting information from CMS on our activities that may be linked to climate change and CITES (decision 15.16). Apologies for the delay. However, we compiled information from all the various CMS agreements, which I hope you will find useful. As you are aware, climate change is likely to become one of the primary threats for migratory species and thus of particular concern for the CMS Family. This concern has been building during the last decade resulting in a number of reviews and projects, which are most likely to be of relevance to CITES since quite a number of migratory species are traded internationally and CITES-listed. In the attached Annex you can find a list of reviews, background papers and COP resolutions on climate change and migratory species. The most recent CMS background document from our 16th Scientific Council in June 2010 (UNEP/CMS/ScC16/Doc.8), which provides you and your team with an overview, is attached, as well as an external legal review regarding the potential mismatch between international legal instruments and their impact in addressing the adaptation of biodiversity to climate change.

There are substantial mandates for both CMS Parties and scientific bodies to further determine the impact of climate change on individual species, as well as to identify and implement suitable adaptation and mitigation measures. Many of these mandates overlap with those of other biodiversity-related treaties; we would be interested to hear from you at the end of your assessment to what extent CITES' climate change mandates overlap with those of CMS and other MEAs. This might well be a task to include in our joint work plan.

We are holding a technical expert workshop on the impact of climate change on migratory species from 6-8 June 2011 at the Tour du Valat research station in southern France (draft agenda attached). The overall aim is to draft recommendations for climate change action by CMS Parties, which will form the substance of our COP10 climate change resolution. A review of the recommendations is envisaged for the period of July-September 2011, during which period CITES will be welcome to provide comments and input to the document.

In terms of projects, you may want to consider a project by the Zoological Society of London, which aimed to assess which migratory species on Appendix I were most threatened by climate change (see Annex 1). Under the Gorilla Agreement there is a project on fuel-efficient stoves to combat deforestation in gorilla habitat, which assists in reducing greenhouse gas emissions (UNEP brochure from p.28 onwards: http://www.unep.org/pdf/30ways.pdf). Under the Wadden Sea Secretariat which coordinates the CMS Wadden Sea Seal Agreement you will find recent outcomes

UNEP/CMS Secretariat * UN Campus * Hermann-Ehlers Str. 10 * 53113 Bonn, Germany
Tel (+49 228) 815 2426 * Fax (+49 228) 815 2449 * E-Mail: secretariat@cms.int * Website: www.cms.int

which are relevant to climate change within the Sylt Declaration and under a number of working groups on climate change and sea level rise (see Annex 1). When it comes to linkages between climate change mitigation measures such as renewable energy and migratory species, there are guidelines for consideration of bats in wind farm projects under EUROBATS (Publication Series No. 3), which are worth consulting. Other adverse effects of renewable energy structures include underwater noise on marine mammals during offshore wind park construction (see ASCOBANS Resolution 6.2; Annex 1).

Where data availability is poor and it is not clear how a migratory species will be affected by climate change, CMS' policy guidance to Parties is to focus on conserving a functional network of habitats for that species in order to maximise its adaptive potential. A Resolution on Ecological Networks is foreseen for the forthcoming CMS COP10 in Norway in November 2011, which will further develop how to assist migratory species in coping with climate change through well-connected ecological networks. For specific questions regarding CMS' climate change policy do not hesitate to contact my colleague, Dr. Aline Kühl (akuehl@cms.int), who will be happy to assist in linking the CITES and CMS climate change mandates.

Depending on the outcome of this exercise we may want to consider including climate change activities in the CMS-CITES joint work programme. Looking forward to the outcomes of your assessment.

Yours sincerely,

Bert Lenten

Officer-in-Charge

Attachments:

1) Annex 1 listing CMS Family climate change decisions and background papers with hyperlinks
2) UNEP/CMS/ScC16/Doc.8
3) A. Trouwborst, 'International Nature Conservation Law and the Adaptation of Biodiversity to Climate Change: a Mismatch?', 21 *Journal of Environmental Law*, 2009, p. 419-442 (http://jel.oxfordjournals.org/cgi/reprint/21/3/419)
4) Draft Agenda for the CMS Technical Workshop on the Impact of Climate Change on Migratory Species

Annex 1: CMS Family climate change decisions and publications

COP8:

UNEP/CMS/Conf. 8.22

http://www.cms.int/bodies/COP/cop8/documents/meeting_docs/en/Doc_22_Climate_Change_and_Migratory_Species.pdf

UNEP/CMS/Inf. 8.19

http://www.cms.int/bodies/COP/cop8/documents/meeting_docs/en/Inf_19_Climate_Change_Migratory_Species.pdf

Resolution 8.13

http://www.cms.int/bodies/COP/cop8/documents/proceedings/pdf/eng/CP8Res_8_13_ClimateChange&MigratorySpecies_E.pdf

COP9:

UNEP/CMS/Conf. 9.24

http://www.cms.int/bodies/COP/cop9/documents/meeting_docs/English/Doc_24_Climate_Change_&_Migratory_Species_E.pdf

Resolution 9.7

http://www.cms.int/bodies/COP/cop9/Report%20COP9/Res&Recs/E/Res_9_07_Climate_Change_En.pdf

Resolution 9.9 and remaining follow-up matters

http://www.cms.int/bodies/COP/cop9/Report%20COP9/Res&Recs/E/Res_9_09_Marine_Mammals_En.pdf

http://www.cms.int/bodies/ScC/16th_scientific_council/Eng/ScC16_Doc_11_Followup_Res_9_9_MigratoryMarineSpecies_E.pdf

16th Scientific Council:

UNEP/CMS/ScC16/Doc.8

http://www.cms.int/bodies/COP/cop9/Report%20COP9/Res&Recs/E/Res_9_07_Climate_Change_En.pdf

UNEP/CMS/ScC16/Inf.8 (ZSL study)

http://www.cms.int/bodies/ScC/16th_scientific_council/Eng/ScC16_Inf_08_Executive_Summary_Climate_Change_Vulnerability_of_Migratory_Species.pdf

UNEP/CMS/ScC16/Inf.8.1 (ZSL study)

http://www.cms.int/bodies/ScC/16th_scientific_council/Eng/ScC16_Inf_08_1_Final_Report_Climate_Change_Vulnerability_of_Migratory_Species_E.pdf

Relevant publications from CMS agreements:

EUROBATS

EUROBATS Publication Series 3: Guidelines for consideration of bats in wind park projects

http://www.eurobats.org/publications/publication_series.htm

ASCOBANS

ASCOBANS Resolution 6.2 on underwater noise

http://www.service-board.de/ascobans_neu/files/mop/MOP6_Resolution2_UnderwaterNoise_final.pdf

African-Eurasian Waterbird Agreement

Maclean, I.M.D., Rehfisch, M.M., Robinson, R.A. & Delany, S. 2008. The Effects of Climate Change on Migratory Waterbirds within the African-Eurasian Flyways. AEWA Technical Series No. 21, African-Eurasian Waterbird Agreement Secretariat, Bonn, Germany. (soon to be published online as a Technical Series publication; download as MOP4 document)

Maclean, I.M.D. & Rehfisch, M.M. 2008b. *Guidelines on the measures needed to help birds adapt to climate change*. AEWA Technical Series No. 26, African-Eurasian Waterbird Agreement Secretariat, Bonn, Germany.(soon to be published online as a Technical Series publication; download as MOP4 document)

Maclean, I.M.D., Rehfisch, M.M., Robinson, R.A. & Delany, S. 2008c. *Migratory waterbirds and climate change: effects within the African-Eurasian Flyways.* African-Eurasian Waterbird Agreement Secretariat, Popular Series, Bonn, Germany. Download.

Agreement on the Conservation of Seals in the Wadden Sea

Sylt Declaration and outcomes of the Eleventh Trilateral Governmental Conference on the Protection of the Wadden Sea, 2010.

http://www.waddensea-secretariat.org/tgc/TGC-Sylt-2010.html

Trilateral Working Group on Coastal Protection and Sea Level Rise.

http://www.waddensea-secretariat.org/management/cpsl/cpsl.html

Convention on the Conservation of Migratory Species of Wild Animals
Secretariat provided by the United Nations Environment Programme

16TH MEETING OF THE CMS SCIENTIFIC COUNCIL

Bonn, Germany, 28-30 June 2010

UNEP/CMS/ScC16/Doc.8
Agenda Item 8

CLIMATE CHANGE: A PRIMARY THREAT FOR MIGRATORY SPECIES

(Prepared by the CMS Secretariat)

Background

1. There is growing evidence that climate change will become one of the primary causes of biodiversity loss within the 21st century. More than one fifth of plant and animal species are likely to be exposed to an increased risk of extinction as a result of global warming of only 2-3 degrees Celsius above preindustrial levels (Fischlin et al. 2007). It is evident that fauna and flora have already been significantly affected by recent climate change (e.g. Walther 2002, Parmesan & Yohe 2003, Parmesan 2006). Amongst these are numerous migratory species, many of which are already suffering declines as a result of climatic changes (Robinson et al. 2005, Both et al. 2006, Møller et al. 2008).

2. The process of animal migration is closely linked to climatic conditions. It is commonly considered an adaptation to benefit from temporal and spatial variation in resource availability. Evolutionary selection pressure has been strong for animals to arrive at the optimal time at key sites, such as those for breeding, wintering, stop over or moulting. As the climate changes, these spatial-temporal optima are likely to shift. Those shifts already being observed are outlined in the following paragraphs. Species persistence will depend on how well and how fast they adapt in already heavily fragmented and anthropologically impacted ecosystems.

Temporal shifts in migration

3. Migratory species are particularly vulnerable to climate change due to their complex life cycles, often crossing multiple biomes in the process. Distinct responses to climate change have been observed in migratory populations, especially for avian species. Temporal changes, specifically the advancement of spring migration, have been particularly frequently encountered in the northern hemisphere. In response to the recent increase in spring temperatures many migratory birds have been arriving earlier to breed (e.g. Gienapp 2007, Pulido & Berthold 2004, Møller et al. 2004, Gordo 2007). Similar observations have been made for fish (Perry et al. 2005). Being unable to arrive at the optimal time due to climate change has been linked to a decline in breeding success (Dunn 2004, Visser et al. 2004). It is worth noting that relatively few data are currently available for the southern hemisphere. In contrast to elsewhere, the majority of birds studied here have delayed rather than brought forward their arrival and breeding dates (Barbraud & Weimerskirch 2006).

Spatial shifts in migration

4. Spatial responses to climate change have included a change in migration distance and direction, commonly leading to shifts in species' range. Migration distance has been shown to elongate as well as shorten (Carey 2009), even to the extent of a complete switch to a sedentary lifestyle. This often results in a change of range states, which may have profound implications for conservation management structures, such as CMS agreements. In Denmark, for example, 35-40% of bird species are expected to disappear in the next 80 years, but a similar number of new bird species is expected to move to Denmark during this time (Huntley et al. 2008). Avian range shifts in the northern hemisphere have tended to move in a northerly direction, but with many exceptions in a westerly, easterly and even southerly direction. It has been suggested that the ranges of migratory species may shift far more than those of sedentary species (Price & Root 2001).

Factors influencing species vulnerability

5. Responses to climate change tend to be species-specific, making it difficult to identify individual policy interventions to reduce the impact of climate change on migratory species. Despite the urgent need it has not yet been possible to make general recommendations for taxonomic or geographically clustered groups of species (Fischlin et al. 2007). The research currently conducted by the Zoological Society of London (ZSL) for CMS is aimed at reducing this gap in our knowledge by identifying those Appendix I species that are particularly threatened by climate change (UNEP/CMS/ScC16/ Inf.8).

6. While it is often technically feasible to predict the preconditions for species survival in a habitat for the future, it is currently extremely challenging to predict how vegetation and the associated faunal assemblages will move from one habitat to another in today's heavily anthropogenically altered habitats (Faaborg et al. 2010). There are however a number of factors, which have been identified to correlate with high species vulnerability, and which are outlined in UNEP/CMS/Conf.9.24 and elsewhere (e.g. Robinson et al. 2005, Robinson et al. 2008, Foden et al. 2008). A brief update of recent relevant findings is provided below.

7. Long-distance migrants are thought to be more vulnerable than short-distance ones because - while away at their distant wintering grounds - they cannot predict when spring starts on their breeding grounds (Both et al. 2010). This "mismatching" becomes particularly problematic when the climate at one critical site changes differently to that of another site within the migratory route of a species. There is good evidence that some declines in avian species are already resulting from this "phenology mismatch hypothesis" (Jones & Cresswell 2010).

8. Mismatching of species presence with food supplies such as insects for birds or krill for cetaceans is a further concern (Dunn 2004). The more specialized the diet of a migratory species is, the more likely it is to be at risk (Vegvari 2010).

9. Species that will reach natural barriers such as the Arctic Ocean as a result of their shift in range are likely to be particularly threatened with extinction. Polar species and those dependent on high elevation habitat such as black-necked cranes (*Grus nigricollis*, CMS Appendix I) are likely to be at high risk. An increase of only a 1^{o} Celsius in global temperatures has been estimated to reduce the suitable habitat of birds breeding at high elevation by more than 50% (Rodenhouse et al. 2008). Resolution 9.9 on migratory marine species recognizes the accelerating threat of climate change to marine species, especially in the Arctic region, and requests the Scientific Council to take action.

10. The sex determination process of many migratory reptiles (e.g., marine turtles) is temperature dependent. There is a significant risk that these species will suffer from skewed sex ratios and demographic collapse due to rapid climate change. However, critical data are lacking, making it difficult to assess how individual species will be affected (Mitchell & Janzen 2010).

11. There are many other broader climate-related threats, which will have a considerable impact on migratory populations, often even outweighing the vulnerability factors outlined below and elsewhere (Foden et al. 2008). Changes in water regime (lower water tables, drought) and wide-ranging habitat loss resulting from climate change have been identified as threats likely to affect the greatest number of terrestrial migratory species (Robinson et al. 2005). With these large-scale factors such as habitat loss it is not a straightforward task to identify which geographic or taxonomic entity is likely to be hit hardest; detailed assessment and modeling is generally required.

12. Fundamentally, the evolutionary potential of a species to adapt to contemporary climate change is critical to its survival. Those species whose migrations are dependent on endogenous clocks and rigid *Zeitgebers*, such as photoperiod, are likely to have the most difficulty in adapting to climate change (Carey 2009). Recent evidence from migratory blackcaps (*Sylvia atricapilla*) suggests that microevolution is feasible for birds that migrate short to average distances and that these birds can genetically adapt at sufficient speed to climate change by migrating shorter distances (Pulido & Berthold 2010). It was shown that under intense selection pressure birds can become resident and that this behavioural change is genetically controlled.

CMS mandate and achievements

13. Whether a species will persist and survive contemporary climate change will depend on their ecological and physiological traits, their evolutionary potential and in certain cases also on the efforts undertaken by humans to prevent their extinction. It is the last of these elements, with which CMS is particularly concerned.

14. The climate change mandate of the Convention on Migratory Species was significantly widened with Resolution 9.7 in 2008 following Resolution 8.13 and several research reports in previous years (for a review see UNEP/CMS/Conf.9.24). The British Trust for Ornithology's publication in 2005 on "Climate Change and Migratory Species" funded by the UK's DEFRA is probably the most outstanding in terms of impact and relevance to CMS species to date (UNEP/CMS/Inf. 8.19; Robinson et al. 2005). The 4th Assessment Report of the IPCC incorporated this report in its meta-analysis and specifically featured the impact of climate change on migratory birds (e.g. see Chapter 4, Box 4.5; Fischlin et al. 2005). The recommendations of the DEFRA report are still immediately relevant to CMS policy, but have not been fully reflected in CMS policy. The Scientific Council revisiting this substantial publication is likely to be beneficial.

15. The CMS Secretariat has been actively implementing Resolution 9.7 during the inter-sessional period since CMS COP9, including activities aimed at Parties to take action. Adaptation and research measures relating to climate change have started to be incorporated into a number of Action Plans, such as the one on White-winged Flufftails (*Sarothrura ayresi*), as mandated by paragraph 12 of the Resolution. Species ranges under future climate

change scenarios have been predicted by collaborating organizations and incorporated into species meetings (e.g. Great Bustard Memorandum of Understanding).

16. With the assistance of the ZSL, the bioclimate database (www.bioclimate.org) has been expanded to cover scientific literature on climate change and migratory species (paragraph 6. Resolution 9.7). This open-access online database for literature on climate change requires further investment and has the potential to become a key resource for science-based policy making in the climate change and biodiversity sector.

17. The CMS Secretariat has been reaching out to a number of other MEAs, NGOs and academic institutions to improve the technical assistance offered to CMS Parties with regard to climate change, as mandated by section 11 of Resolution 9.7. The Secretariat presented the threats that climate change poses to migratory species and the CMS mandate to other MEAs (e.g. Bern Convention), Parties and Non-Parties (e.g. Republic of Korea) and other conservation organizations, such as IUCN. At UNFCCC COP15 in Copenhagen the Convention had a conference booth and made direct contact with delegates emphasizing the need for action and importance of migratory species, for example highlighting the fact that migratory species can act as early indicators of climate-induced biological change. Preliminary results of the ongoing ZSL research project, which is outlined below, were presented.

18. Parties contributed to increase the capacity in the CMS Secretariat to address climate change matters by creating at COP9 a new post for an Associate Scientific and Technical Officer. The incumbent has been in the post since June 2010, devotes approximately one fifth of her work time to climate change and is supervised directly by the Scientific and Technical Officer.

19. The 15th Scientific Council highlighted that there is a significant need for policy makers to obtain an overview of the impact of climate change on migratory species and obtain regular updates on newly emerging threats, so that measures can be taken to conserve the species in question. However, currently there are only two types of assessments available: (1) model predictions for habitat and species range shifts and (2) species-specific assessments for only a relatively small number of species. On this basis it is difficult to identify which species are most threatened and what action is likely to have the largest positive conservation impact.

20. There is currently no assessment system in place to identify which migratory species are most threatened by climate change and require urgent attention. CMS is addressing this need with the assistance of the ZSL, as mandated by paragraph 2 of Resolution 9.7 (Party mandate). Research is being conducted to identify those CMS Appendix I species, which are most likely to become more endangered due to climate change (UNEP/CMS/ScC16/Inf.8). The threat categories developed illustrate that wide-ranging species are generally vulnerable, with turtles being particularly threatened. Marine mammals, waterbirds and seabirds tend to also be strongly affected by climate change. A more detailed assessment of waterbirds within the African-Eurasian Flyways is available elsewhere (AEWA/MOP 4.27). The ZSL assessment, as well as the methodology used, is to undergo full review by the Scientific Council.

21. IUCN is currently developing a “red flag” system for its Red List to indicate that a species is particularly threatened by climate change. This wider warning system is likely to be particularly useful to highlight those species which are not yet identified through CMS listing or

other measures as threatened. The ZSL project, on the other hand, provides a more detailed view of more than 40 CMS Appendix I species. It is for the 16th Scientific Council to advise on how to proceed with regard to assessing the remainder of Appendix I and all of Appendix II.

Outstanding matters where Scientific Council guidance is required

22. A regional workshop on climate change and migratory species is mandated by paragraph 8 of Resolution 9.7. There are several needs that the workshop could address. Firstly, the methodology to identify the species most threatened by climate change could be reviewed. Secondly, the workshop could assess Party needs and/or capacity building for managing migratory species with regards to future climate change scenarios (para. 5, Res. 9.7). This could include monitoring of climate-induced biological change. Thirdly, the workshop could focus on how to design and manage critical site networks with climate change in mind. The Scientific Council is requested to advise on what subjects the workshop should focus on. Offers to host the workshop would be welcome.

23. At COP8 a working group on climate change was set up. The chair of the group successfully convened climate change experts again during COP9 to review and draft Resolution 9.7. While the group was actively engaged during COP9 in 2008, there has been no action since. From the perspective of the Secretariat the need for an intersessionally active working group is pressing. It is therefore proposed that Scientific Councillors be identified for this challenging task, which together with CMS observers and other qualified experts could form such an intersessional working group on climate change.

24. CMS Parties have committed themselves to implementing the CMS climate change mandate through Resolutions 8.13 and 9.7. However, only the United Kingdom has to date significantly invested in doing so. An excellent research review (UNEP/CMS/Inf. 8.19) and an assessment of the use of migratory species as biological indicators of climate change (UNEP/CMS/Inf. 9.22) have been funded by the UK. Since the 15th Scientific Council met in 2008, no voluntary contributions have been received for climate change. A continuation of this trend will make implementation of the Convention's work on climate change impossible. Scientific Councillors are requested to bring the striking discrepancy between the level of threat and financial support to Parties' attention.

25. It is evident that functional networks of habitats encompassing full regional variation are required to assist migratory species in adapting to climate change. The promising results of recent genetic studies outlined above suggest that many species will be able to adapt. Conserving functional habitat networks is likely to be the "common denominator" of most adaptation measures, especially in the light of overwhelming uncertainty surrounding the response of species to climate change. Given CMS's limited capacity and funds, it may therefore be fruitful to focus more strongly on appropriate critical site development for migratory species, at least with regard to terrestrial and avian species.

26. There is also a need for protected areas and legal entities such as CMS agreements to adjust flexibly to climate change related species range shifts. Mobile protected areas focussing on only seasonally critical habitat may provide a useful addition, such as the mobile *zakazniks* that were used by the Soviet Union to protect the calving grounds of the Saiga antelope *Saiga tatarica* in spring (CMS Appendix II, Gordon et al. 2004). Parties should also introduce flexibility in their framework legislation in order to gain agility in the designation of new sites that will facilitate species adaptation to climate change.

Action requested:

The 16th Scientific Council is requested to:

a. Consider the establishment of an intersessional working group on climate change;

b. Identify suitable experts and a chair for the intersessional working group on climate change;

c. Revisit recommendations made by Robinson et al. 2005;

d. Identify key gaps in current research on the interactions of climate change and migratory species and encourage the closing of these gaps such as our understanding of the impact of climate change on non-avian species or in the southern hemisphere;

e. Review the latest available information on the current and predicted conservation status, in relation to the possible consequences of climate change, of all Arctic migratory marine species listed on the CMS Appendices and consider whether additional marine species warrant (Resolution 9.9);

f. Assess how the vulnerability of the remaining CMS Appendix I species and Appendix II species should be assessed (section 2, Resolution 9.7) and identify potential funding sources;

g. Seek avenues for research and dialogue on the effects of climate change on migratory marine species with other Multi-lateral Agreements and other relevant organizations (Resolution 9.9);

h. Consider whether CMS should engage more closely with the UNFCCC Nairobi Programme and submit an action pledge;

i. Raise awareness of the threat that climate change poses to migratory species;

j. Encourage Parties and Non-Parties to incorporate climate change into their national monitoring strategies;

k. Encourage and plan further critical site networks, which are designed to be well-connected under future climate change scenarios;

l. Evaluate how the legal rigidity of protected area systems could be overcome, including the application of seasonally restricted and mobile protected areas;

m. Bring the discrepancy between climate change threat and funding available to address this threat to the attention of CMS Parties and advise on the agenda and focus of the regional workshop and explore possible host countries; and

n. Report back to the 10th Conference of Parties on the outcomes and findings of the activities listed above.

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International Nature Conservation Law and the Adaptation of Biodiversity to Climate Change: a Mismatch?

Arie Trouwborst*

Abstract

Biological diversity worldwide is expected to come under increasing stress on account of climate change. International cooperation between states is required, *inter alia* because species and ecosystems will (attempt to) shift their distributions, including across jurisdictional boundaries. Current international nature conservation regimes were, however, not created with climate change in mind and are likely to fall short of what is required to adequately facilitate the adaptation of species and ecosystems to climate change. The article explores the mismatch involved and the associated challenge of making international nature conservation law climate change proof.

Keywords: adaptation, biological diversity, climate change, international law, nature conservation

1. Introduction

Many effects of climate change on species and ecosystems have been documented recently, and in the future climate change is expected to have increasingly

*Lecturer in environmental law at Tilburg University, Faculty of Law, PO Box 90153, 5000 LE Tilburg, The Netherlands, (a.trouwborst@uvt.nl). Helpful comments by the anonymous referees are gratefully acknowledged by the author.

important impacts.[1] Organisms are responding to modifications in temperature, humidity and weather patterns, and more frequently occurring extreme weather events associated with climate change are also

1 See Intergovernmental Panel on Climate Change, *Climate Change 2007: Impacts, Adaptation and Vulnerability* (Cambridge University Press, Cambridge 2007) and also, *inter alia*, RL Peters and JDS Darling, 'The Greenhouse Effect and Nature Reserves' (1985) 35 Bioscience 707; RL Peters, 'Consequences of Global Warming for Biological Diversity', in RL Wyman (ed), *Global Climate Change and Life on Earth* (Chapman & Hall, New York 1991) 99; RL Peters and TJ Lovejoy (eds), *Global Warming and Biological Diversity* (Yale University Press, New Haven 1992); ME Visser et al, 'Warmer Springs Lead to Mistimed Reproduction in Great Tits (*Parus major*)' (1998) 265 Proc Roy Soc Lond B 1867; M Kapelle et al, 'Effects of Climate Change on Biodiversity: A Review and Identification of Key Research Issues' (1999) 8 Biodivers Conserv 1383; L Hughes, 'Biological Consequences of Global Warming: Is the Signal Already Apparent?' (2000) 15 Trends Ecol Evol 56; OE Sala et al, 'Biodiversity – Global Biodiversity Scenarios for the Year 2100' (2000) 287 Science 1770; Intergovernmental Panel on Climate Change, *Climate Change 2001* (Cambridge University Press, Cambridge 2001); H Oene et al (eds), *Long-Term Effects of Climate Change on Biodiversity and Ecosystem Processes*, NRP Report No 410200089 (RIVM, Bilthoven 2001); M Scheffer et al, 'Catastrophic Shifts in Ecosystems' (2001) 413 Nature 591; JP McCarty, 'Ecological Consequences of Recent Climate Change' (2001) 15 Conserv Biol 320; JF McLaughlin et al, 'Climate Change Hastens Populations Extinctions' (2002) 99 Proc Natl Acad Sci USA 6070; LR Iverson and AM Prasad, 'Potential Redistribution of Tree Species Habitat under Five Climate Change Scenarios in the Eastern US' (2002) 155 Forest Ecol Manage 205; H Gitay et al, *Climate Change and Biodiversity*, Intergovernmental Panel on Climate Change Technical Paper V (IPCC, Geneva 2002); RL Root et al, 'Fingerprints of Global Warming on Wild Animals and Plants' (2003) 421 Nature 57; R Green et al (eds), *Global Climate Change and Biodiversity* (RSPB, Bedfordshire 2003); N Dudley, *No Place to Hide: Effects of Climate Change on Protected Areas* (WWF, Gland 2003); C Parmesan and G Yohe, 'A Globally Coherent Fingerprint of Climate Change Impacts Across Natural Systems' (2003) 421 Nature 37; CE Burns et al, 'Global Climate Change and Mammalian Species Diversity in US National Parks' (2003) 100 Proc Natl Acad Sci USA 11474; CD Thomas et al, 'Extinction Risk from Climate Change' (2004) 427 Nature 145; A Moller et al (eds), *Birds and Climate Change* (Elsevier Academic Press, Amsterdam 2004); M Edwards and A Richardson, 'Impact of Climate Change on Marine Pelagic Phenology and Trophic Mismatch' (2004) 430 Nature 881; L Christensen et al, 'Vulnerability of the Asian Typical Steppe to Grazing and Climate Change' 63 Climate Change 351; European Environment Agency, *Impacts of Europe's Changing Climate*, EEA Report No 2 (EEA, Copenhagen 2004); DS Lemmen and FJ Warren (eds), *Climate Change Impacts and Adaptation: A Canadian Perspective (Government of Canada, Ottawa 2004)*; M B Araújo et al, 'Would Climate Change Drive Species Out of Reserves? An Assessment of Existing Reserve-Selection Methods' (2004) 10 Global Change Biol 1618; R Brooker and J Young (eds), *Climate Change and Biodiversity in Europe: A Review of Impacts, Policy, Gaps in Knowledge and Barriers to the Exchange of Information between Scientists and Policy Makers* (Background Paper for Meeting of European Platform for Biodiversity Research Strategy, Aviemore 2005); LE Chambers et al, 'Climate Change and its Impact on Australia's Avifauna' (2005) 105 Emu 1; TE Lovejoy and L Hannah (eds), *Climate Change and Biodiversity* (Yale University Press, New Haven 2005); JA Pounds et al, 'Widespread Amphibian Extinctions from Epidemic Disease Driven by Global Warming' (2006) 439 Nature 161; JR Malcom et al, 'Global Warming and Extinctions of Endemic Species from Biodiversity Hotspots' (2006) 20 Conserv Biol 538; Secretariat of the Convention on Biological Diversity, *Global Biodiversity Outlook 2* (CBD Secretariat, Montreal 2006); O Hoegh-Guldberg et al, 'Coral Reefs under Rapid Climate Change and Ocean Acidification' (2007) 318 Science 1737; VR de Dios et al, 'Climate Change Effects on Mediterranean Forests and Preventive Measures' (2007) 33 New Forests 29; B Huntley et al, *A Climatic Atlas of European Breeding Birds* (Lynx Edicions, Barcelona 2007); W Leng et al, 'Response of Larch Species to Climate Changes' (2008) 1 J Plant Eco 203; BH McRay et al, 'A Multi-Model Framework for Simulating Wildlife Population Response to Land-Use and Climate Change' (2008) 219 Ecol Model 77.

of significance. Many species and ecosystems are expected to (attempt to) shift their distributions to higher latitudes and altitudes—at estimated mean speeds of up to fifteen metres a day. Nature has adapted to climate changes in similar ways in the past, although the current rate of change is unusually rapid and, moreover, many species and ecosystems are already under substantial stress through habitat fragmentation and other factors. Overall, climate change is thus anticipated to have significant adverse consequences for biodiversity—in other words, the variability of species and ecosystems.[2]

Evidently, if losses are to be minimised, a considerable degree of international co-operation is called for in order to facilitate the adaptation of species and ecosystems to the effects of climate change. This begs the question whether international nature conservation law[3] as it stands is up to this substantial task and, if not, how the mismatch concerned can be remedied. Providing the answer(s) involves no small task either and is beyond the scope of a single paper. The present article, therefore, merely purports to provide some pieces of the puzzle by undertaking an initial assessment of the current capacity of international nature conservation law to facilitate the adaptation of species and ecosystems to climate change, and by outlining the challenge of enhancing that capacity. The article is thus intended to contribute to filling a gap in international law research where, in contrast to climate change mitigation and the adaptation of *human* systems, the adaptation of *natural* systems to climate change remains a largely untilled area.[4] Although the focus of this study is limited to international law, some of its findings will almost certainly apply at the national level as well, where similar discussions are taking place.[5]

2 In Art 2 of the Convention on Biological Diversity (adopted 5 June 1992; in force 29 December 1993; 1760 UNTS 79), biological diversity is defined as 'the variability among living organisms from all sources including, inter alia, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species, between species and of ecosystems.'

3 International nature conservation law is understood here to encompass all norms of public international law concerned with the management, use and/or preservation of ecosystems and species. Although its core is formed by instruments with conservation as main aim, it also includes fisheries instruments and parts of instruments primarily concerned with (e.g. water or air pollution).

4 Rare exceptions include GC Boere and D Taylor, 'Global and Regional Governmental Policy and Treaties as Tools Towards the Mitigation of the Effect of Climate Change on Waterbirds' (2004) 146 Ibis 111; S Erens et al, 'Adaptation to Climate Change to Save Biodiversity: Lessons Learnt from African and European Experiences', paper presented at IUCN Academy of Environmental Law Conference 'Climate Law in Developing Countries Post-2012' (Ottawa 2008) and accessible at http://ssrn.com; and A Cliquet et al, 'Adaptation to Climate Change: Legal Challenges for Protected Areas' (2009) 5 Utrecht L Rev 158. The latter study is limited to EU law, which is also discussed (in Dutch) in HE Woldendorp, 'Integratiedebat in het Natuurbeschermingsbeleid' (2007) Nederlands Juristenblad 2881; and HE Woldendorp, 'Dynamische Natuur in een Statische Rechtsorde' (2009) 36 Tijdschrift voor Milieu en Recht 134.

5 See, for instance, B Griffith et al, 'Climate Change Adaptation for the US National Wildlife Refuge System' (2009) Environ Manage (published online ahead of print on 23 June 2009); JE Hossell et al, 'Climate Change and Nature Conservation: Implications for Policy and

The structure of the article is as follows. Section 2 introduces international nature conservation law and sketches the general direction in which this body of international law is developing. Section 3 discusses the impact of climate change on species and ecosystems and the measures required to enable their adaptation to climate change. Section 4 brings the former two sections together and assesses the extent of the (mis)match between adaptation requirements and international law. Section 5 offers some brief preliminary observations on the future challenges for international nature conservation law in light of the climate change adaptation issue. Section 6, finally, contains concluding remarks.

2. International Nature Conservation Law

A. The Biodiversity Crisis and International Law

On the current agenda of the international community of states, the so-called biodiversity crisis occupies a prominent position. According to mainstream scientific opinion, species of animals and plants are presently disappearing at a rate which is 100 to 1,000 times higher than the average rate of extinction since life on Earth originated.[6] The main causes of recent extinctions are well-known, and all of human origin. In order of significance, they are: (i) the removal, degradation and/or fragmentation of species' habitats; (ii) the introduction of alien species; (iii) overexploitation and (iv) pollution.[7] Frequently, extinctions have been the result of a combination of these factors.

Broad agreement exists that the current rate at which biodiversity is being reduced amounts to a major concern, for reasons varying from ethics to economics. In 1992, biodiversity conservation was accordingly recognised as a 'common concern of humankind'.[8] Ten years later, the states attending the World Summit on Sustainable Development (WSSD) in Johannesburg committed themselves to 'the achievement by 2010 of a significant reduction in the current rate of loss of biological diversity.'[9] The pledge to attain this

Practice in Britain and Ireland' (2003) 11 J Nat Conserv 67; and (in respect of The Netherlands) B van Leeuwen and P Opdam, 'Klimaatsverandering Vergt Aanpassing van het Natuurbeleid (2003) 104 De Levende Natuur 122. For a recent illustration of the debate in the UK, see the letter entitled 'Our Natural Environment Now Faces an Unprecedented Threat' by Helen Phillips, chief executive of Natural England, published in *The Times* of 20 June 2009. In it she advances that 'as a society, we have to do far, far more to enable the natural environment to adapt to climate change'.

6 See, for instance, Millennium Ecosystem Assessment, *Ecosystems and Human Well-being: Biodiversity Synthesis* (World Resources Institute, Washington DC 2005) 3–4.

7 For two popular descriptions see R Leakey and R Lewin, *The Sixth Extinction: Patterns of Life and the Future of Humankind* (Anchor, New York 1996); and M Delibes de Castro, *Vida: La Naturaleza en Peligro* (Ediciones Temas de Hoy, Madrid 2001).

8 Convention on Biological Diversity (n 2), Preamble.

9 WSSD Plan of Implementation (adopted 4 September 2002), para 44.

'2010 Biodiversity Target' was repeated at the 2005 UN World Summit in New York and in various other global and regional settings. Somewhat predictably, however, the closer the 2010 deadline approached, the stronger the doubts which have been expressed regarding the likelihood of the target's attainment.[10] In this connection, the environment ministers gathered at the recent G8/G20 meeting in Siracusa, while recognising the 'importance of the 2010 target,' called for an 'ambitious and *achievable* post-2010 common framework on biodiversity, [..] based on the lessons learned from the 2010 target.'[11]

States have long recognised that the threats to species and the benefits of conserving them are partly international or even global in scope. The need for international cooperation has been especially obvious for species in the global commons, like fish in the high seas, and of organisms moving across jurisdictional boundaries. International treaties have thus been adopted, for instance, to conserve migratory birds through commitments to the protection of breeding, stop-over and wintering sites—which may be located in many different states. Other typical obligations in nature conservation treaties concern the regulation of exploitation or trade. Many treaties contain lists of species and/or habitats to be protected. The earliest legally binding international conservation agreements were concluded more than a century ago, forming the beginning of a proliferation that led to the large number of treaties presently in force which aim at conserving what is alternatively termed 'wildlife', 'wild fauna and flora', 'living natural resources', 'biological resources' or, most state-of-the-art, 'biological diversity'. Some of these agreements concern single species like polar bears or tuna, others concern defined terrestrial or ocean regions, while still others are global. Notable examples of the latter are the 'big five', consisting of the 'big four'[12] concluded in the 1970s—the Ramsar Wetlands Convention,[13] the World Heritage Convention,[14] the Convention on

10 A Balmford et al, 'The Convention on Biological Diversity's 2010 Target' (2005) 307 Science 212; B Jack 'The European Community and Biodiversity Loss: Missing the Target?' (2006) 15 Rev Eur Commun Int Environ L 304; European Commission, *European Union Biodiversity Action Plan 'Halting the Loss of Biodiversity by 2010 – and Beyond* (European Commission, Brussels 2008); and UN General Assembly Resolution 63/219 (adopted 19 December 2008), acknowledging in its Preamble that 'an unprecedented effort is needed to achieve' the 2010 target.

11 'Carta di Siracusa' on Biodiversity (adopted 24 April 2009), Preamble, paras II and VIII.

12 S Lyster, *International Wildlife Law* (Grotius Publications, Cambridge 1985).

13 Convention on Wetlands of International Importance Especially as Waterfowl Habitat (adopted 2 February 1971; in force 21 December 1975; 996 UNTS 245); generally, see MJ Bowman, 'The Ramsar Convention on Wetlands: Has it Made a Difference?' (2002) 10 Ybk Int Coop Environ Dev 61; and J Verschuuren, 'The Case of Transboundary Wetlands under the Ramsar Convention: Keep the Lawyers Out!' (2008) 19 Colo J Int'l Envtl L Policy 49, at 56–63.

14 UNESCO Convention Concerning the Protection of the World Cultural and Natural Heritage (adopted 16 November 1972; in force 17 December 1975; 11 ILM (1972) 1358); generally, see F Francioni (ed), *The 1972 World Heritage Convention: A Commentary* (Oxford University Press, Oxford 2008).

International Trade in Endangered Species (CITES)[15] and the Bonn Migratory Species Convention (CMS)[16]—and the 1992 Biodiversity Convention (CBD).[17]

B. From Deathbed Conservation to a Precautionary and Holistic Approach

It is important in the present context to note the recent, broad acknowledgment of the need for international nature conservation law to shift from reactive and *ad hoc* approaches to proactive and holistic ones. The primary vehicles for the associated law reform are the precautionary principle and the ecosystem approach. Some further explanation is appropriate.

Many conservation regimes, by focusing on species that were already endangered, have long been inherently reactive, a condition exacerbated by the fact that states usually undertook no action until a species' endangered status was scientifically well documented. Additionally, by focusing on the regulation of *some* activities affecting *some* species or sites, international nature conservation law, at least until recently, embodied an *ad hoc*, fragmented approach. These two features combined form an obstacle to long-term conservation. By waiting for populations to fall to dangerous levels and disregarding the broader ecosystems within which species function, international regimes in fact often provided for little more than palliative care, or 'deathbed conservation'.[18] This insight translated into increased calls for holistic and proactive approaches to nature conservation and for the law reform necessary to achieve those.

At the intergovernmental level, the 1992 UN Conference on Environment and Development (UNCED) marked the worldwide breakthrough of the awareness that fundamental changes to international nature conservation law were called for. The Biodiversity Convention and a number of instruments adopted in UNCED's wake are testimony of a paradigm shift from *ad hoc* endangered species conservation towards the proactive and holistic conservation and sustainable use of biological diversity. States formally reaffirmed the notion that species are inextricably linked to each other and to their environments,

15 Convention on International Trade in Endangered Species of Wild Fauna and Flora (adopted 3 March 1973; in force 1 July 1975; 993 UNTS 243).

16 Convention on the Conservation of Migratory Species of Wild Animals (adopted 23 June 1979; in force 1 November 1983; 10 ILM (1980) 15). Generally on the CMS, see S Lyster, 'The Convention on the Conservation of Migratory Species of Wild Animals (The 'Bonn Convention')' (1989) 29 Nat Res J 979; and R Caddell, 'International Law and the Protection of Migratory Wildlife: An Appraisal of Twenty-Five Years of the Bonn Convention' (2005) 16 Colo J Int'l Envtl L Policy 113.

17 See n 2 above; on the CBD generally, see D Bodansky, 'International Law and the Protection of Biological Diversity' (1995) 28 Vanderbilt J Transnatl L 623; and MJ Bowman and C Redgwell (eds), *International Law and the Conservation of Biological Diversity* (Kluwer Law International, The Hague 1996).

18 A term coined by JC Kunich, 'The Fallacy of Deathbed Conservation under the Endangered Species Act' (1994) 24 Environ L 501.

forming complex ecosystems, and that these ecosystems themselves are interconnected across the globe.

Two novel concepts in particular represent the move away from 'deathbed conservation': the precautionary principle and the ecosystem approach. The primary purpose of the precautionary principle (or approach)[19] is to prevent serious or irreversible harm to the environment. It entails taking preventive action in response to threats of environmental harm at an early stage, including in situations of scientific uncertainty. Under the precautionary principle, the benefit of any doubt is given to nature: *in dubio pro natura*. Given the complexity of ecosystems, the ensuing difficulty of predicting the effects on them of potentially harmful human activities, and the serious and irreversible nature of species extinctions, the principle embodies the pre-eminent response to the failure of reactive conservation policies. The (or an) ecosystem approach,[20] in turn, represents for *ad hoc* approaches what precaution is for reactive approaches: their opposite. It stands for holism—the 'complete picture'. By aiming for 'healthy' ecosystems or 'ecosystem integrity', the ecosystem approach protects component species in the process. More specifically, it entails the holistic management of human activities, based on the best available knowledge on the components, structure and dynamics of ecosystems, and aimed at satisfying human needs in a way that does not compromise the integrity of ecosystems. Roughly synonymous terms include 'ecosystem management', 'ecosystem-based management' and 'ecosystem considerations' in management.

19 Literature on the precautionary principle is vast. For selected introductions and lists of further literature, see D Freestone and E Hey (eds), *The Precautionary Principle and International Law* (Kluwer Law International, The Hague 1996); N de Sadeleer, *Environmental Principles* (Oxford University Press, Oxford 2002); J Peel, *The Precautionary Principle in Practice* (The Federation Press, Annandale 2005); R Cooney and B Dickson (eds), *Biodiversity and the Precautionary Principle: Risk and Uncertainty in Conservation and Sustainable Use* (Earthscan, London 2005); and A Trouwborst, 'The Precautionary Principle in General International Law: Combating the Babylonian Confusion' (2007) 16 Rev Eur Commun Int Env L 185.

20 Literature on the ecosystem approach includes RE Grumbine, 'What is Ecosystem Management?' (1994) 8 Conserv Biol 27; OA Houck, 'On the Law of Biodiversity and Ecosystem Management' (1997) 81 Minnesota L Rev 869; H Wang, 'Ecosystem Management and Its Application to Large Marine Ecosystems: Science, Law, and Politics' (2003) 35 Ocean Dev Int L 41; RD Smith and E Maltby, *Using the Ecosystem Approach to Implement the Convention on Biological Diversity* (IUCN, Gland/Cambridge 2003); O McIntyre, 'The Emergence of an "Ecosystem Approach" ' to the Protection of International Watercourses under International Law' (2004) 13 Rev Eur Commun Int Environ L 1; S Parsons, 'Ecosystem Considerations in Fisheries Management: Theory and Practice' (2005) 20 Int J Marine Coastal L 381; W Howarth, 'The Progression Towards Ecological Quality Standards' (2006) 18 JEL 3; J Morishita, 'What is the Ecosystem Approach for Fisheries Management?' (2008) 32 Mar Pol 19; A Fabra and V Gascón, 'The Convention on the Conservation of Antarctic Marine Living Resources (CCAMLR) and the Ecosystem Approach' (2008) 23 Int J Mar Coast L 567; Y Tanaka, *A Dual Approach to Ocean Governance* (Ashgate, Aldershot 2009) 75–82; and A Trouwborst, 'The Precautionary Principle and the Ecosystem Approach in International Law: Differences, Similarities and Linkages' (2009) 18 Rev Eur Commun Int Environ L 26.

Both the precautionary principle and the ecosystem approach are hot topics, which is probably due as much to their complexity as to their importance. Their precise definitions, status and implications in terms of international law, as well as the relationship between them, continue to be debated by states and scholars alike.[21] Although elements of each concept can be traced further back, the incorporation of the precautionary principle and the ecosystem approach into international nature conservation law did not start in earnest until the early 1990s, with UNCED acting as watershed between the old and new approaches. The two novel approaches have since been incorporated to varying extents in newly negotiated instruments and infused into pre-existing regimes like the 'big four'. In accordance with these international developments, states have also begun to implement the precautionary principle and the ecosystem approach in their relevant domestic laws and policies. Although reform of the law is thus underway, there is concern as to whether its speed and comprehensiveness are satisfactory when accepting the existence of an urgent need for a precautionary and holistic approach to nature conservation.[22] As the next section will demonstrate, the precautionary and ecosystem approaches are very pertinent to the issue of the adaptation of biodiversity to climate change.

3. Climate Change Adaptation

A. Nature on the Move

The influence of climate change must now be added to the traditional four causes of biodiversity loss mentioned above. Changes in temperature, humidity and weather patterns have consequences for species and ecosystems. There is convincing evidence that large-scale impacts are already occurring and these are expected to increase in the future.[23] These effects are likely to be both far-reaching and complex. Biome distributions and the distribution, abundance and migration patterns of many species stand to be altered due to structural changes in mean temperature of air and sea water and in rainfall patterns. In addition, the increased incidence of extreme weather events such as droughts, floods and storms, will have its own effects.

Impacts will probably vary greatly from species to species and ecosystem to ecosystem, depending *inter alia* on the latitude and altitude at which they occur, and on their ecological flexibility. Generally speaking, however, species

21 Some of these issues are discussed in Trouwborst, ibid.

22 See, for instance, PW Birnie et al, *International Law and the Environment* (3rd edn Oxford University Press, Oxford 2009); Trouwborst, ibid, at 36–37; and A Trouwborst, 'Seabird Bycatch – Deathbed Conservation or a Precautionary and Holistic Approach?' (2008) 11 J Int Wildlife L Policy 293.

23 See sources in n 1 above.

and ecosystems are expected to shift to higher latitudes and altitudes. In some places, ecosystems are likely to disappear altogether, including coral reefs, low-lying tropical island ecosystems (due to sea-level rise), tropical montane cloud forests (altered weather patterns) and situations where shifting biomes and species simply have no room ahead of them into which to move. To illustrate the latter, in the future Scottish crossbills will be with their backs against the wall, or rather the ocean, in the very North of Scotland, if the southern limit of their range advances northward as predicted.[24] Extreme habitat alterations are also expected in the Arctic, with predicted sea ice loss and major shifts in biomes such as tundras and boreal forests.[25] Finally, even in the oceans, very minor alterations of water temperature can have profound impacts on, for instance, the distribution, numbers and diets of seabirds over great areas.[26]

Climate changes have occurred throughout the Earth's history, and the general response of species and ecosystems has been to move gradually into new, suitable areas. The present situation differs substantially in two respects, however. First, the rate at which the climate is warming appears to be unprecedented in the last 2.5 million years. Second, much biodiversity is now confined to protected areas within otherwise hostile surroundings, and is already under significant stress as a result of human actions. All in all, although precise predictions cannot be made, significant species extinctions are anticipated.[27]

B. Required Adaptation Measures

Obviously, international nature conservation regimes cannot stop climate change from happening, but they could facilitate adaptation by dealing with the other stressors to biodiversity. Adaptation encompasses both promoting resilience to change (in other words, reducing vulnerability to change) and accommodation of change. A wide variety of adaptation measures has been identified or proposed in the pertinent conservation biology literature and in various policy reports.[28] Broadly speaking, there appears to be a consensus

24 Huntley et al (n 1).

25 Arctic Council, *Impacts of a Warming Arctic: Arctic Climate Impact Assessment Overview Report* (Cambridge University Press, Cambridge 2004).

26 See, for instance, International Council for the Exploration of the Seas (ICES), *2008 Report of the Working Group on Seabird Ecology* (ICES, Copenhagen 2008).

27 See, for instance, Intergovernmental Panel on Climate Change 2007 (n 1); McLaughlin et al (n 1) and Thomas et al (n 1).

28 See Peters and Darling (n 1); RL Peters and JP Myers, 'Preserving Biodiversity in a Changing Climate' (1992) 8 Issues Sci Technol 66; CA Bloomgarden, 'Protecting Endangered Species under Future Climate Change: From Single-Species Preservation to an Anticipatory Policy Approach' (1995) 19 Environ Manage 641; PN Halpin, 'Global Climate Change and Natural-Area Protection: Management Responses and Research Directions' (1997) 7 Ecol Appl 828; JE Williams, 'The Biodiversity Crisis and Adaptation to Climate Change: A Case Study from

that adaptation action must at a minimum: (i) promote the dispersal of species; (ii) increase available habitat; and (iii) reduce pressures not linked to climate change.

Promoting dispersal means facilitating movement between (current and future) habitats. This can be done in a number of ways, including the creation of wildlife-friendly corridors or 'stepping stones' running parallel to

Australia's Forests' (2000) 61 Environ Monit Assess 65; RF Noss, 'Beyond Kyoto: Forest Management in a Time of Rapid Climate Change' (2001) 15 Conserv Biol 578; CG Soto, 'The Potential Impacts of Global Climate Change on Marine Protected Areas' (2001) 11 Rev Fish Biol Fisher 181; L Hannah et al, 'Climate Change – Integrated Conservation Strategies' (2002) 2 Global Ecol Biogeogr 485; L Hannah et al, 'Conservation of Biodiversity in a Changing Climate' (2002) 16 Conserv Biol 264; LJ Hansen et al, *Buying Time: A User's Manual for Building Resistance and Resilience to Climate Change in Natural Systems* (WWF, Gland 2003); Dudley (n 1); Araújo et al (n 1); Brooker and Young (n 1); Lemmen and Warren (n 1); Office of the Deputy Prime Minister, *The Planning Response to Climate Change: Advice on Better Practice*, (ODPM, London 2004); P Opdam and D Wascher, 'Climate Change Meets Habitat Fragmentation: Linking Landscape and Biogeographical Scale Levels in Research and Conservation' (2004) 117 Biol Conserv 285; PE Hulme, 'Adapting to Climate Change: Is There Scope for Ecological Management in the Face of a Global Threat?' (2005) 42 J Appl Ecol 784; TB Reusch et al, 'Ecosystem Recovery After Climatic Extremes Enhanced by Genotypic Diversity' (2005) 102 Proc Natl Acad Sci USA 2826; P Williams et al, 'Planning for Climate Change: Identifying Minimum-Dispersal Corridors for the Cape Proteaceae' (2005) 19 Conserv Biol 1063; D Welch, 'What Should Protected Area Managers Do in the Face of Climate Change?' (2005) 22 The George Wright Forum 75; L Hannah et al, 'The View from the Cape: Extinction Risk, Protected Areas, and Climate Change' (2005) 55 BioScience 231; European Environment Agency, *Vulnerability and Adaptation to Climate Change in Europe*, EEA Technical Report No 7/2005 (EEA, Copenhagen 2005); GAB Da Fonseca et al, 'Managing the Matrix', in TE Lovejoy and L Hannah (eds), *Climate Change and Biodiversity* (Yale University Press, New Haven 2005) 346; CJ Lemieux and DJ Scott, 'Climate Change, Biodiversity Conservation and Protected Area Planning in Canada' (2005) 49 Canadian Geogr 384; TL Root and SH Schneider, 'Conservation and Climate Change: The Challenges Ahead' (2006) 20 Conserv Biol 706; FS Chapin et al, 'Policy Strategies to Address Sustainability of Alaskan Boreal Forests in Response to a Directionally Changing Climate' (2006) 103 Proc Natl Acad Sci USA 16637; JA Harris et al, 'Ecological Restoration and Global Climate Change' (2006) 14 Restor Ecol 170; EEM Nillesen and EC van Ierland (eds), *Climate Adaptation in the Netherlands* (Netherlands Environmental Assessment Agency, Bilthoven 2006); M Fernández and F Borja Barrera, *Doñana y Cambio Climático: Propuestas para la Mitigación de los Efectos* (WWF/Adena, Madrid 2006); De Dios et al (n 1); L Hannah et al, 'Protected Area Needs in a Changing Climate' (2007) 5 Front Ecol Environ 131; J McLachlan et al, 'A Framework for Debate of Assisted Migration in an Era of Climate Change' (2007) 21 Conserv Biol 297; CI Millar et al, 'Climate Change and Forests of the Future: Managing in the Face of Uncertainty' (2007) 17 Ecol Appl 2145; D Scott and C Lemieux, 'Climate Change and Protected Areas Policy, Planning and Management in Canada's Boreal Forest' (2007) 83 Forest Chron 347; BRANCH Partnership, *Planning for Biodiversity in a Changing Climate*, BRANCH Project Final Report (Natural England, Sheffield 2007); JM Piper et al, *Spatial Planning for Biodiversity in Our Changing Climate*, Annex 1 of BRANCH Partnership, ibid; RJ Mitchell et al, *England Biodiversity Strategy – Towards Adaptation to Climate Change*, DEFRA Report CRO327 (DEFRA 2007); Royal Society, *Biodiversity-Climate Interactions: Adaptation, Mitigation and Human Livelihoods: Report of an International Meeting, June 2007* (The Royal Society, London 2008); US Climate Change Science Program and Subcommittee on Global Change Research, *Preliminary Review of Adaptation Options for Climate-Sensitive Ecosystems and Resources* (CCSP, 2008); TR McClanahan et al, 'Conservation Action in a Changing Climate' (2008) 1 Conserv Lett 53; and the useful overview provided in NE Heller and ES Zavaleta, 'Biodiversity Management in the Face of Climate Change: A Review of 22 Years of Recommendations' (2009) 142 Biol Conserv 14.

environmental gradients—for example, on a north-south axis—and generally by establishing a matrix between protected areas which is sympathetic to present and likely future needs of the broadest possible range of species. In extreme cases, dispersal may entail the translocation, through direct human intervention, of species to new areas—for instance, moving the aforementioned Scottish crossbills to Iceland, as the birds are not deemed capable of crossing the Atlantic by themselves. Increasing total habitat available, in particular by protecting and restoring large and unfragmented areas, advances the resilience of populations and ecosystems, including their ability to survive and recover from extreme weather events. Obviously, such resilience is also promoted when stressors other than climate change are curbed. For instance, marine ecosystems will be better able to adapt to climate change when the adverse effects of fishing, such as overexploitation and habitat impairment, are minimised.

Although much will depend on regional and local circumstances and the peculiarities of the species and ecosystems concerned, protected area policies are clearly of key importance to success or failure of adaptation. Indeed, it was already predicted years ago that climate change considerations may 'dwarf any other consideration in planning for reserve management' in the twenty-first century.[29] In particular, there appears to be substantial agreement in the scientific literature that successful adaptation of biodiversity to climate change requires the establishment and management of protected area networks at the largest possible scale, with extensive core areas and adequate connectivity.[30] In view of the considerable uncertainty on precise future reactions of individual species and ecosystems to climate change, such networks (would) reflect a typical precautionary approach, enabling the greatest possible biodiversity to survive and evolve.[31] Finally, it is frequently recommended that adaptation measures be implemented urgently, as the effects of climate change on biodiversity are already unfolding and the creation of new habitats may take many decades.[32]

29 Peters (n 1) 167.

30 On ecological networks generally, see G Bennett, *Integrating Biodiversity Conservation and Sustainable Use: Lessons Learned From Ecological Networks*, (IUCN, Gland/Cambridge 2004); G Bennett and KJ Mulongoy, *Review of Experience with Ecological Networks, Corridors and Buffer Zones*, CBD Technical Series no 23 (Secretariat of the CBD, Montreal 2006); and M Kettunen et al, *Guidance on the Maintenance of Landscape Connectivity Features of Major Importance for Wild Flora and Fauna: Guidance on the Implementation of Article 3 of the Birds Directive (79/409/EEC) and Article 10 of the Habitats Directive (92/43/EEC)* (Institute for European Environmental Policy, Brussels 2007).

31 Also, Erens et al (n 4) 3 and 29.

32 Incidentally, concern over the pace at which adaptation action is undertaken by states is not unique for the biodiversity context, but also relates to adaptation measures regarding human populations.

4. International Law and Adaptation: Assessing the Mismatch

The pressing need for these and other adaptation measures outlined above adds a wholly new dimension to the need for international cooperation in the field of nature conservation. What is more, climate change is now placing demands on international nature conservation law which are fundamentally different from, and more severe than, the demands for which most conservation treaties were originally negotiated. Rather than a limited number of migratory species, huge numbers of species which are normally stationary such as reptiles and, indeed, entire ecosystems will (try to) relocate, irrespective of the existence of political boundaries.

Whereas evidently, as one study puts it, 'biodiversity conservation and climate change cannot be regarded separately anymore,'[33] the international agreements focused on climate change provide little guidance on the topic of biodiversity adaptation. In broad terms, the Climate Change Convention (UNFCCC)[34] prescribes the taking of 'precautionary measures' to mitigate the adverse effects of climate change and requires the formulation and implementation of national or regional programmes containing 'measures to facilitate adequate adaptation to climate change.'[35] According to Verheyen, the UNFCCC thus contains an 'obligation to undertake anticipatory, planned adaptation measures' and 'does not allow for parties to rely on the autonomous adaptation of systems.'[36] Nevertheless, the relevant provisions of the UNFCCC and the Kyoto Protocol[37] do not specifically address adaptation of species and ecosystems.[38] Judging from the negotiating text resulting from the recent climate talks in Bonn and from the various proposals for 'post-Kyoto' instruments submitted by states, this seems unlikely to change much in any follow-up UNFCCC regime.[39]

Against this background, the following paragraphs will ponder what other international regimes have to offer in terms of the facilitation of the adaptation of species and ecosystems to climate change. Especially with a view to the third type of adaptation action mentioned above—that is, reducing pressures

33 Erens et al (n 4) 16.

34 UN Framework Convention on Climate Change (adopted 9 May 1992; in force 21 March 1994; 31 ILM (1992) 851).

35 Arts 3(3) and 4(1)(b), respectively.

36 R Verheyen, 'Adaptation to the Impacts of Anthropogenic Climate Change – The International Legal Framework' (2002) 11 Rev Eur Commun Int Environ L 129, at 131.

37 Protocol to the UNFCCC (adopted 11 December 1997; in force 16 February 2005; 37 ILM (1998) 22).

38 See Art 4(1)(e)–(f) of the UNFCCC and Art 10(b) of the Kyoto Protocol.

39 The revised negotiating text (FCCC/AWGLCA/2009/INF.1) resulting from the sixth session of the UNFCCC Ad Hoc Working Group on Long-term Cooperative Action (Bonn, 1–12 June 2009) does not contain detailed provisions on biodiversity adaptation to climate change. The same is true of the five proposals for a new protocol and the twelve proposals for amendment of the Kyoto Protocol which have been submitted by states to the UNFCCC Secretariat.

not linked to climate change—a wider array of instruments is germane to the issue than might initially be suspected, including treaties on trade in endangered species, toxic chemicals and fisheries. An obvious problem with respect to these is the difficulty of determining how much alleviation of the pressures involved would be sufficient to adequately promote adaptation. The analysis below is confined to the most directly relevant global nature conservation instruments, namely the Ramsar Convention, the World Heritage Convention, the CMS and the CBD, as well as an example from the regional level, namely the nature conservation regime of the European Union (EU).

A. Ramsar Convention

Wetlands[40] such as rivers can play important roles in terms of ecological connectivity, so that their conservation will be conducive to the dispersal of species. The most recent, 10th Conference of the Parties (COP) to the Ramsar Convention accordingly acknowledged that the 'conservation and wise use of wetlands enables organisms to adapt to climate change by providing connectivity, corridors and flyways along which they can move.'[41] Similarly, as for resilience, the protection of large and unfragmented wetlands will buffer associated species and ecosystems against extreme weather events. These features would seem to indicate a potential role of significance for the Ramsar Convention with regard to the facilitation of biodiversity adaptation to climate change. At the 8th COP in 2002, parties had already highlighted the 'limited adaptive capacity' of some wetlands, 'including reefs, atolls, mangroves and those in prairies, tropical and boreal forests and arctic (including permafrost) and alpine ecosystems,' and the associated danger of 'significant and irreversible damage' to these wetlands.[42] To curtail such damage, Ramsar parties are called upon to 'manage wetlands so as to increase their resilience to climate change and extreme climatic events,'[43] *inter alia* by reducing 'the multiple pressures they face.'[44]

Notwithstanding these non-legally binding COP decisions, and the additional relevant guidance contained in the extensive collection of 'Ramsar Handbooks on the Wise Use of Wetlands'[45] which has been compiled under

40 Wetlands are defined in Art 1(1) of the Ramsar Convention as 'areas of marsh, fen, peatland or water, whether natural or artificial, permanent or temporary, with water that is static or flowing, fresh, brackish or salt, including areas of marine water the depth of which at low tide does not exceed six metres.'

41 COP Resolution X.24, entitled 'Climate Change and Wetlands' (adopted 4 November 2008), para 12.

42 COP Resolution VIII.3, entitled 'Climate Change and Wetlands: Impacts, Adaptation, and Mitigation' (adopted 26 November 2002), para 5.

43 Ibid, para 14.

44 Resolution X.24 (n 41), para 28.

45 Ramsar Convention Secretariat, *Ramsar Handbooks for the Wise Use of Wetlands* (3rd edn Ramsar Convention Secretariat, Gland 2007).

auspices of the Convention, the legally binding obligations set out in the Ramsar Convention itself for its 159 parties are relatively weakly and generally phrased and—having been drafted in 1971—not tailored to climate change. In particular, states parties are to 'formulate and implement their planning so as to promote the conservation of the wetlands included in the List, and as far as possible the wise use of wetlands in their territory.'[46] The List of Wetlands of International Importance referred to here contains over 18,000 wetland sites covering about 173 million hectares.[47] Parties are also under an obligation to 'promote the conservation of wetlands and waterfowl by establishing nature reserves on wetlands, whether they are included in the List or not.'[48] Furthermore, parties must consult with each other about the implementation of the Convention, especially with respect to transboundary wetlands.[49] A less crucial provision which is nevertheless intriguing for present purposes commits each party to informing the Ramsar Secretariat promptly 'if the ecological character of any wetland in its territory and included in the List has changed, is changing or is likely to change as the result of technological developments, pollution or other human interference.'[50]

B. World Heritage Convention

A substantial amount of ecologically important sites around the globe qualify as 'natural heritage' under the World Heritage Convention,[51] and a part of these are included in the World Heritage List.[52] The 186 state parties to the Convention are committed to doing everything within their power to ensure the 'identification, protection, conservation, presentation and transmission to future generations' of the natural heritage situated on their territory.[53] Moreover, to warrant that 'effective and active measures' are taken for the protection of the sites concerned, each party 'shall endeavor, in so far as possible, and as appropriate for each country,' to 'integrate the protection of that heritage into comprehensive planning programmes' and to 'take the

46 Art 3(1) of the Convention.
47 See www.ramsar.org.
48 Art 4(1).
49 Art 5.
50 Art 3(2); see also, Ramsar Convention Secretariat (n 45), Handbook 15: Addressing Change in the Ecological Character of Ramsar Sites and Other Wetlands.
51 Natural heritage is defined in Art 2 of the Convention as 'natural features consisting of physical and biological formations or groups of such formations, which are of outstanding universal value from the aesthetic or scientific point of view; geological and physiographical formations and precisely delineated areas which constitute the habitat of threatened species of animals and plants of outstanding universal value from the point of view of science or conservation; natural sites or precisely delineated natural areas of outstanding universal value from the point of view of science, conservation or natural beauty.'
52 Art 11 and www.whc.unesco.org.
53 Art 4 of the Convention.

appropriate legal, scientific, technical, administrative and financial measures necessary for the identification, protection, conservation, presentation and rehabilitation of this heritage.'[54] The latter may well (need to) comprise adaptation measures, given the threats posed by climate change to several sites from the World Heritage List—including the Kilimanjaro National Park, the Sagarmatha National Park in Nepal and the Great Barrier Reef.[55] Indeed, in 2005, the World Heritage Committee recommended parties to the Convention to 'seriously consider the potential impacts of climate change within their management planning' and to 'take early action in response to these potential impacts.'[56]

On the one hand, therefore, the fact that several large and relatively pristine areas like the Great Barrier Reef are listed as World Heritage may well promote the resilience of resident species and ecosystems to climate change. Likewise, the occurrence on the World Heritage List of mountain ranges such as the Canadian Rockies and the Volcanoes of Kamchatka may assist dispersal. On the other hand, the role of the World Heritage Convention in facilitating the poleward and upward shifts of species and ecosystems is likely to be limited for the plain reason that the Convention is, more than anything, devoted to keeping things as they are. In principle, the World Heritage Convention regime could react to climate-induced shifts of species and ecosystems, for instance through listing sites where new threatened species show up, and withdrawing sites from the World Heritage List following the disappearance of species or ecosystems because of which they were originally designated. In addition, sites which are endangered on account of climate change, like the aforementioned Kilimanjaro and Great Barrier Reef, may be included in the 'List of World Heritage in Danger'.[57] Obviously, however, these possibilities can hardly be labeled adequate for a comprehensive and *anticipatory* facilitation of biodiversity adaptation.

C. Convention on Migratory Species

The CMS, which now has 111 parties, was adopted in 1979 with the aim of ensuring a 'favourable conservation status' for migratory animal species. The pre-climate change origin of the CMS finds reflection in the fact that, according to the Convention, a favourable conservation status exists when, *inter alia*, the distribution of the migratory species concerned approaches

54 Art 5(a) and 5(d).
55 For these and other examples, see A Colette et al, *Case Studies on Climate Change and World Heritage* (UNESCO World Heritage Centre, Paris 2007).
56 World Heritage Committee Decision 29COM 7B.a (adopted 17 July 2005), para 6.
57 See Art 11(4). Inclusion in the 'Danger List' does not directly impose additional legal obligations on states.

'historic coverage'.[58] The CMS solicits the provision of immediate and strict protection to species listed in its Appendix I ('Endangered Migratory Species').[59] The required protection consists among other things of conserving and, 'where feasible and appropriate,' restoring 'those habitats of the species which are of importance in removing the species from danger of extinction,' as well as of tackling 'activities or obstacles that seriously impede or prevent the migration of the species.'[60] Species (groups) listed in CMS Appendix II are to be the subject of focused daughter agreements.[61] This Appendix contains migratory species with an unfavourable conservation status and other species which would significantly benefit from the negotiation of specific agreements.[62] A final provision worth mentioning—if only because it is 'precautionary' *avant la lettre*—concerns the general recognition of 'the need to take action to avoid any migratory species becoming endangered.'[63]

Climate change adaptation is not an issue which has escaped the attention of the parties to the CMS. At the 8th COP in 2005 it was recognised that climate change 'may significantly affect the behaviour, distribution and abundance of migratory species and may change the ecological character of their habitats.'[64] Range states of Appendix I species were urged to 'implement, as appropriate, adaptation measures that would help reduce the foreseeable effects of climate change' on the species involved.[65] The 9th COP in 2008 more affirmatively expressed its concern about the fact that climate change 'is already known to be affecting the habitat, behaviour, distribution and abundance' of CMS-listed species.[66] The meeting acknowledged that 'due to climate change, ranges of migratory species are changing and that CMS instruments may need to adapt to these variations.'[67] After a precautionary call on parties not to delay action 'despite the remaining uncertainty surrounding the full scale of the impacts of climate change on migratory species,' the Resolution in question urges parties to 'identify which migratory species are most likely to be directly or indirectly threatened or impacted by climate change,' to 'design and implement adaptation strategies' for such species, and to ensure the 'incorporation of climate change impacts and relevant adaptation measures into species-specific Action Plans.'[68]

58 Art I(1)(c)(4).
59 Arts II(3)(b) and III.
60 Art III(4)(a)–(b).
61 Art IV.
62 Art IV(1).
63 Art II(2).
64 COP Resolution 8.13 (adopted 25 November 2005), Preamble.
65 Ibid, para 3.
66 COP Resolution 9.7 (adopted 5 December 2008), Preamble.
67 Ibid.
68 Ibid, paras 1, 2, 4 and 12.

It is, furthermore, interesting to record that climate change adaptation measures are being contemplated at the level of CMS daughter agreements as well. The African-Eurasian Waterbirds Agreement (AEWA)[69] is a case in point. At the 4th Meeting of the Parties (MOP) in 2008, the parties to the Agreement were called upon to develop or strengthen climate change-related conservation action for waterbirds, and were urged to 'designate and establish comprehensive and coherent networks of adequately managed protected sites as well as other adequately managed sites, to accommodate range-shifts and facilitate waterbirds' dispersal.'[70] In addition, the resolution in question directs parties to, 'as far as possible, maintain the ecological character of the sites important for waterbird populations under changing climate conditions through appropriate management measures,' and to 'provide wider habitat protection for species with dispersed breeding ranges, migration routes or winter ranges where the site conservation approach would have little effect, especially under climate change conditions.'[71] Finally, the MOP requested the AEWA Technical Committee to 'assess whether the existing international networks of sites are sufficient for the protection of migratory waterbirds, including the projected climate change effects' and, if necessary, to indicate what complementary measures should be taken.[72] One set of conservation guidelines on waterbird adaptation action has already been drafted under AEWA auspices.[73]

All the same, from the perspective of climate change adaptation of biodiversity there is an inescapable downside to the CMS regime, namely its exclusive focus on *migratory* species—that is, species the members of which 'cyclically and predictably'[74] or 'periodically'[75] cross one or more national jurisdictional boundaries. Even though subsequent CMS practice has yielded flexible interpretations enabling coverage of snow leopards and gorillas, the term 'migratory' is unlikely to be understood as encompassing the gradual latitudinal and altitudinal shifts of traditionally non-migratory species—which are many times more plentiful than migratory species—in response to climate change. It can hardly be stressed sufficiently that this restricted scope constitutes a major limitation for present purposes.

69 Agreement on the Conservation of African-Eurasian Migratory Waterbirds (adopted 16 June 1995; in force 1 November 1999; 6 Ybk Int Environ L (1995) 907). On AEWA generally, see B Lenten, 'A Flying Start for the Agreement on the Conservation of African-Eurasian Migratory Waterbirds (AEWA)' (2001) 4 J Int Wildlife L Policy 159; and R Adam, 'Waterbirds, the 2010 Biodiversity Target, and Beyond: AEWA's Contribution to Global Biodiversity Governance' (2008) 38 Environ L Rev 87.

70 MOP Resolution 4.14 (adopted 19 September 2008), paras 1 and 4.

71 Ibid, paras 6 and 7.

72 Ibid, para 5.

73 Draft Conservation Guidelines on Measures Needed to Help Waterbirds Adapt to Climate Change (prepared by British Trust for Ornithology, August 2008), Doc AEWA/MOP 4.28.

74 Art I(1)(a) of the CMS.

75 Art IV(4) of the CMS.

D. Convention on Biological Diversity

With its focus on biological diversity in the broadest sense and its virtually universal participation,[76] the scope of the 1992 CBD is certainly comprehensive enough from the present perspective. Besides, the Convention was negotiated at a time when attention to climate change was on the rise. Although Article 8 on *in situ* conservation of biodiversity does not refer explicitly to climate change adaptation, it is clearly very relevant to the issue:

> Each Contracting Party shall, as far as possible and as appropriate:
>
> (a) Establish a system of protected areas or areas where special measures need to be taken to conserve biological diversity;
> (b) Develop, where necessary, guidelines for the selection, establishment and management of protected areas or areas where special measures need to be taken to conserve biological diversity;
> (c) Regulate or manage biological resources important for the conservation of biological diversity whether within or outside protected areas, with a view to ensuring their conservation and sustainable use;
> (d) Promote the protection of ecosystems, natural habitats and the maintenance of viable populations of species in natural surroundings;
> (e) Promote environmentally sound and sustainable development in areas adjacent to protected areas with a view to furthering protection of these areas; and
> (f) Rehabilitate and restore degraded ecosystems and promote the recovery of threatened species, *inter alia*, through the development and implementation of plans or other management strategies.[77]

Other germane provisions include the duties to develop national biodiversity strategies or plans and to integrate biodiversity conservation into other 'relevant sectoral or cross-sectoral plans, programmes and policies.'[78] The latter obligation—which is accompanied by the typical formulation 'as far as possible and as appropriate'—must be deemed to apply, for example, to infrastructural and agricultural policies, which tend to have far-reaching implications for the capacity of species to disperse.

These obligations in the Convention have come to be informed and accompanied by a growing set of voluntary commitments and guidelines adopted by the CBD COP, including with respect to climate change adaptation

76 The CBD currently has 191 parties.
77 Art 8(a)–(f).
78 Art 6(a)–(b).

and protected area networks.[79] Parties have been urged by the COP to 'enhance the integration of climate-change considerations related to biodiversity in their implementation of the Convention,' for instance by incorporating such considerations in national biodiversity strategies and by taking 'appropriate actions to address' the impacts of climate change on biodiversity.[80] The COP has repeatedly stressed the importance of the precautionary and ecosystem approaches in this connection.[81] More concretely, parties have been called upon to 'integrate climate change adaptation measures in protected area planning, management strategies, and in the design of protected area systems,'[82] to 'take measures to manage ecosystems so as to maintain their resilience to extreme climate events and to help mitigate and adapt to climate change,'[83] and to 'cooperate regionally in activities aimed at enhancing habitat connectivity across ecological gradients, with the aim of enhancing ecosystem resilience and to facilitate the migration and dispersal of species with limited tolerance to altered climatic conditions.'[84] Several technical reports have been commissioned to promote the implementation of these COP Decisions.[85]

Undeniably, however, the general and heavily qualified nature of the relevant obligations in the CBD itself constitutes an apparent drawback. The Convention does not explicitly address climate change adaptation. In particular, it lacks firm and specific provisions prescribing the establishment of robust and representative protected area networks consisting of sufficiently large and adequately interconnected sites.

E. European Union

Although clearly an important role in the present context is reserved for intergovernmental cooperation at the regional level, the scope of this article does not permit for anything near a comprehensive assessment of the many existing regional nature conservation regimes.[86] One telling example is examined,

79 For a more elaborate overview and discussion, see Erens et al (n 4) 4–9.
80 COP Decision IX/16 (adopted 30 May 2008), paras A(4)(b) and (i).
81 Ibid, paras A(1)(h) and A(4)(h).
82 COP Decision VII/28 (adopted 20 February 2004), para 1(4)(5).
83 COP Decision VII/15 (adopted 20 February 2004), para 12.
84 COP Decision VIII/30 (adopted 31 March 2006), para 4.
85 See Ad-Hoc Technical Expert Group on Biological Diversity and Climate Change, *Interlinkages Between Biological Diversity and Climate Change: Advice on the Integration of Biodiversity Considerations into the Implementation of the United Nations Framework Convention on Climate Change and its Kyoto Protocol*, CBD Technical Series No 10 (Secretariat of the CBD, Montreal 2003); Ad-Hoc Technical Expert Group on Biodiversity and Adaptation to Climate Change, *Guidance for Promoting Synergy among Activities Addressing Biological Diversity, Desertification, Land Degradation and Climate Change*, CBD Technical Series No 25 (Secretariat of the CBD, Montreal 2006).
86 A number of African and European regimes providing for transboundary protected areas and ecological networks are discussed in Erens et al (n 4).

however, namely the regime constituted by the Birds[87] and Habitats[88] Directives of the EU.[89] These are singled out because they are widely considered to be among the most advanced and effective regional nature conservation instruments.[90]

The Directives are aimed at ensuring biodiversity conservation, including through the establishment of a 'coherent European ecological network' of protected areas, known as Natura 2000.[91] The 1979 Birds Directive obliges EU Member States to designate Special Protection Areas (SPAs) for bird species listed in its Annex I and for (other) migratory bird species, in-so-far as these occur regularly in areas within their jurisdiction.[92] In particular, 'the most suitable territories in number and size' for all of these species are to be classified as SPAs.[93] Similar measures are to be taken under the Habitats Directive in respect of natural habitat types listed in Annex I and species listed in Annex II of the Directive.[94] After a multiple-stage procedure sites of importance for these habitats and species are to be designated as Special Areas of Conservation (SAC). For the selection and delimitation of sites under the Birds and Habitats Directives, Member States are to employ ecological criteria only.[95] In light of the jurisprudence of the European Court of Justice (ECJ), it is beyond doubt that considerations of an economic nature or concerning expected future management difficulties are to play no part.[96] Together, the SPAs and SACs are to form the aforementioned protected area network Natura 2000.[97]

In respect of these sites, EU Member States are to take 'the necessary conservation measures' which 'correspond to the ecological requirements' of the habitats and species involved.[98] In addition, states 'shall take appropriate steps to avoid, in the special areas of conservation [and SPAs], the deterioration

87 Council Directive 79/409/EEC on the conservation of wild birds (adopted 2 April 1979).
88 Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora (adopted 21 May 1992).
89 See on these instruments in the context of climate change adaptation also Cliquet et al (n 4); Erens et al (n 4) at 15–19; and Kettunen et al (n 30).
90 See, for instance, PF Donald et al, 'International Conservation Policy Delivers Benefits for Birds in Europe' (2007) 307 Science 810.
91 Art 3(1) of the Habitats Directive.
92 Art 4(1)–(2).
93 Ibid.
94 Art 4.
95 See Art 4 of each directive.
96 See, for instance, Case C-355/90 *Commission v Spain* [1993] ECR I-04221, paras 26–27; Case C-44/95 *Regina v Secretary of State for the Environment, ex parte: Royal Society for the Protection of Birds* [1996] ECR I-3805, para 26; Case C-67/99 *Commission v Ireland* [2001] ECR I-5757; Case C-71/99 *Commission v Germany* [2001] ECR I-5811; and Case C-220/99 *Commission v France* [2001] ECR I-5831.
97 Art 3 of the Habitats Directive.
98 Art 6(1) of the Habitats Directive (which, according to Art 7, also applies to SPAs designated under the Birds Directive).

of natural habitats.'[99] In the case of birds a general, supplementary duty exists to 'take the requisite measures to preserve, maintain or re-establish a sufficient diversity and area of habitats' for all wild bird species, whether in or outside SPAs.[100] Meaningfully, this provision reads like an obligation of result and also appears to be understood that way by the ECJ.[101] Climate change is not as such addressed in the Birds and Habitats Directives, but the legal requirements enumerated here are obviously of substantial consequence for the adaptation question, particularly in terms of bolstering resilience. In this regard, the ECJ has clarified that in order to comply with these requirements 'it may be necessary to adopt both measures intended to avoid external man-caused impairment and disturbance and measures to prevent natural developments that may cause the conservation status of species and habitats in SACs to deteriorate.'[102] It is also noteworthy that Member States are under a continuous duty to designate or nominate sites which (newly) qualify for inclusion in Natura 2000, which may happen more often in the future as climate change advances.[103]

Be that as it may, the regime constituted by the Birds and Habitats Directives is not without shortcomings from the perspective of nature conservation in general and climate change adaptation in particular. First, in contrast with the comprehensive species coverage of the Birds Directive, numerous vulnerable species and habitat types remain outside the scope of the Habitats Directive—*inter alia* in the marine realm.[104] Second, both Directives lack an obligation on Member States to coordinate their implementation internationally. The desirability of such coordination, which has traditionally been especially prominent in the case of migratory species and transboundary sites, is greatly augmented by the need to facilitate the adaptation of biodiversity to climate change.[105] Third, and perhaps most importantly, the regime is frail when it comes to connectivity, and by extension dispersal in response to climate change. The relevant provisions of the Habitats[106] Directive leave this crucial matter largely to the discretion of each Member State:

> Where they consider it necessary, Member States shall endeavour to improve the ecological coherence of Natura 2000 by maintaining, and

99 Art 6(2) (again in conjunction with Art 7) of the Habitats Directive.
100 Art 3 of the Birds Directive.
101 See Case C-117/00 *Commission v Ireland* [2002] ECR I-5335, para 21.
102 Case C-6/04, *Commission v United Kingdom* [2005] ECR I-9017, para 34, concerning Art 6(2) of the Habitats Directive; see also Cliquet et al (n 4) at 169.
103 Case C-3/96 *Commission v The Netherlands* [1998] ECR I-3031; Case C-209/04 *Commission v Austria* [2006] ECR I-2755; Woldendorp 2007 (n 4) at 2886; Erens et al (n 4) at 15; Cliquet et al (n 4) at 164.
104 For one discussion, see H M Dotinga and A Trouwborst, 'The Netherlands and the Designation of Marine Protected Areas in the North Sea: Implementing International and European Law' (2009) 5 Utrecht L Rev 21.
105 Also Erens et al (n 4) at 16.
106 For most birds the issue is less crucial on account of their elevated mobility.

> where appropriate developing, features of the landscape which are of major importance for wild fauna and flora.[107]
> Such features are those which, by virtue of their linear and continuous structure (such as rivers with their banks or the traditional systems for marking field boundaries) or their function as stepping stones (such as ponds or small woods), are essential for the migration, dispersal and genetic exchange of wild species.[108]

If left unremedied, this Achilles' heel of the Natura 2000 regime is bound to make itself felt as climate change impacts on European biodiversity intensify.

Recent EU policy demonstrates awareness of the shortcomings outlined here. One of the ten objectives of the 2006 EU Biodiversity Action Plan is to support biodiversity adaptation to climate change.[109] The Plan set a target for 2010 to 'substantially strengthen coherence, connectivity and resilience of the protected areas network' so as to achieve 'favourable conservation status of species and habitats in the face of climate change' through the application of 'tools which may include flyways, buffer zones, corridors and stepping stones (including as appropriate to neighbouring and third countries),' besides 'actions in support of biodiversity in the wider environment.'[110] The European Commission has commissioned various studies and a guidance document on connectivity.[111] Lastly, in its fresh White Paper on climate change adaptation generally, the Commission stipulates:

> Regarding habitats, the impact of climate change must also be factored into the management of Natura 2000 to ensure the diversity of and connectivity between natural areas and to allow for species migration and survival when climate conditions change. In future it may be necessary to consider establishing a permeable landscape in order to enhance the interconnectivity of natural areas.[112]

5. Towards Climate Change Proof Law?

It appears that the international nature conservation regimes which have been reviewed above (can) contribute to some extent to facilitating the adaptation of species and ecosystems to climate change, mostly by improving resilience and to a lesser degree by enabling dispersal. The legal instruments involved

107 Art 3(3); see also, Art 10(1).
108 Art 10(2).
109 European Commission Communication COM (2006) 216 (endorsed by EU Council on 18 December 2006), Objective 9.
110 Ibid, para A9.4.2.
111 Kettunen et al (n 30).
112 Communication COM (2009) 147 (1 April 2009), para 3.2.3.

are generally inadequate when it comes to connectivity requirements[113] and the transboundary coordination of climate change adaptation action. The issue of active translocation is not addressed at all. It bodes ill that even an advanced regional nature conservation regime like the one constituted by the EU Birds and Habitats Directives demonstrates significant deficiencies in these respects. Other shortcomings concern limitations of scope, including notable gaps in species coverage. Ostensibly, the comprehensive regimes which are needed are currently not in place, whether at a global or a regional scale. In sum, international nature conservation law as it stands appears to fall short of what is required to adequately facilitate the adaptation of biodiversity to climate change. This is hardly surprising, considering that the legal regimes reviewed were created at a time when the impacts of climate change on species and ecosystems were not or only barely an issue.

Clearly, states are increasingly aware that significant intergovernmental cooperation is called for to minimise the adverse impacts of climate change on biodiversity and to facilitate adaptation. To illustrate, the following is among the actions which were agreed by the G8/G20 Siracusa meeting referred to previously: 'Proactively putting in place actions for climate change adaptation of natural and managed ecosystems,' because 'spontaneous adaptation is not expected to be sufficient to reduce the impacts on biodiversity at all levels, or on vulnerable ecosystems.'[114] The various other policy statements reviewed above seem to signal states' growing recognition that law reform is necessary in order to achieve a precautionary and holistic approach to climate change adaptation and avoid 'deathbed conservation' in isolated protected areas.

Yet, it remains open to question whether there is sufficient awareness of the unprecedented nature of the required paradigm shift. Whereas traditionally international nature conservation law has precisely focused on conserving species and habitats in their places of origin, it must now become a 'moving company',[115] accompanying species and ecosystems on their journeys to higher latitudes and more suitable areas. Conservation regimes, in particular regarding protected areas, will now be expected to facilitate the departure of current species and ecosystems and the arrival of new ones, instead of keeping everything as it is. Obviously, the international and comprehensive approach which is required to achieve this poses a 'major challenge for the future.'[116] It is interesting to note the contrast between the need for flexibility discussed

113 A similar conclusion was drawn by Erens et al (n 4) at 28–29.
114 'Carta di Siracusa' (n 11), para 2.
115 Term used (in Dutch) by R Roos and B van Tooren, 'Flora en Fauna in Rep en Roer' in R Roos and S Woudenberg, *Opgewarmd Nederland* (Stichting Natuurmedia/Uitgeverij Jan van Arkel/Stichting Natuur en Milieu, Amsterdam/Utrecht 2004) 99.
116 DJ Pain and PF Donald, 'Outside the Reserve: Pandemic Threats to Bird Biodiversity' in K Norris and DJ Pain, *Conserving Bird Biodiversity: General Principles and their Application* (CUP, Cambridge 2002) 157.

here, aimed at enhancing biodiversity protection in the face of climate change, with more conventional discussions on the perceived need for more flexibility in, for instance, the application of the EU Birds and Habitats Directives. In the latter context, flexibility tends to be understood as entailing the lessening of habitat and species protection in order to allow for economic development.

It is beyond the remit of the present article to detect and compare options for the law reform which is so evidently required. Here at the end of the article, however, one preliminary glance ahead is perhaps permissible. The negotiation of a protocol to the CBD on the adaptation of biodiversity to climate change appears to constitute an option which could hardly be ignored in any future research devoted to analysing the possibilities for improving the capacity of international law to facilitate biodiversity adaptation—especially given the comprehensive aims and scope of the CBD and the attention which has already been paid by its COP to adaptation issues and the development of protected area networks. Such a protocol could, among other things, set out criteria concerning the reform or, as appropriate, creation of regional nature conservation regimes.

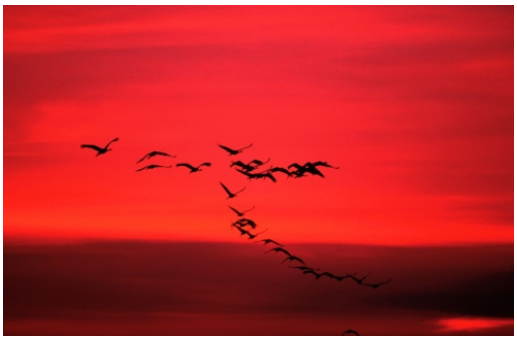
6. Conclusion

Current international nature conservation law appears to fall short of what is required adequately to facilitate adaptation of biodiversity to the effects of climate change. If the biodiversity crisis is to be stemmed, and if the precautionary principle and the ecosystem approach are to be implemented properly, this mismatch needs to be remedied. Further research is called for to determine more exactly to what extent contemporary international nature conservation law is capable of facilitating the adaptation of species and ecosystems to climate change. More importantly, future research ought to focus on the question of what further law reform is necessary to make it fully capable. Identifying the dimensions of the problem involved is the vital first step. The next and more challenging one consists of finding the best route(s) towards climate change proof international nature conservation regimes.

UNEP CMS

UNEP/CMS Technical Workshop

The Impact of Climate Change on Migratory Species: the current status and avenues for action



Tour du Valat, Camargue, France
6-8 June, 2011

Objectives:

- Assess the current situation and highlight emerging issues
- Identify and prioritise options for national and international action to improve the adaptive capacity of migratory species
- Draft policy recommendations for CMS Parties, which will become the basis of a climate change resolution at the 10th CMS Conference of the Parties (Norway, November 2011)

Moderator: Prof. Colin Galbraith (Vice Chair of the CMS Scientific Council, Chair of the CMS Working Group on Climate Change)

Time and Venue: Monday, 6 June – Wednesday, 8 June 2011
Tour de Valat research station (http://en.tourduvalat.org), France

Programme in brief: Two-day workshop, followed by a one-day Camargue excursion

Participation: Participation is limited to approximately 20 experts

Working language: English

Accommodation: In Arles, close to Tour de Valat (transportation will be provided)

DRAFT AGENDA

Day I: RESEARCH UPDATE

Moderator: Aline Kühl

9.00-9.30: Opening addresses

Ministry of Ecology, Sustainable Development, Transport and Housing

Jean Jalbert, Director General, Tour du Valat

Borja Heredia, Scientific & Technical Officer, UNEP/CMS Secretariat

Colin Galbraith, Chair of the CMS Working Group on Climate Change

9.30-10.00: Introduction to the aims & objectives of the workshop

Aline Kühl, Associate Scientific & Technical Officer, UNEP/CMS Secretariat

A brief overview of the climate change mandate and its implementation under the Convention, as well as avenues for policy development to address the threat which climate change poses for migratory species. See Resolution 9.7 and background information.

10.00-10.30: The impact of climate change on migratory species – an overview

James Pearce-Higgins, British Trust for Ornithology (BTO)

Climate change is already having a noticeable impact on migratory species across the globe, such as a shift in migration timing, migration routes and also declines in populations. The presentation will provide an overview of the interactions between climate change and migratory species, illustrate how migratory species could be used as indicators in this context and focus on how different taxonomic groups listed on CMS Appendices are or will be affected.

10.30-11.00: The potential of migratory species to adapt to climate change

Francisco Pulido, Complutense University of Madrid

To what extent can migratory species adapt to climate change? What lessons can we learn for the conservation of different taxonomic groups? Which factors influence the vulnerability of a migratory species to climate change?

11.00-11.30: Bird species of concern and recommendations for conservation measures

Vicky Jones, Birdlife International

Which migratory birds will be particularly hard hit by climate change? Which measures could improve their adaptive capacity?

11.30-12:00 Apéritif

12.00-13.30: Lunch

13.30-14.00: The impact of climate change on marine mammals I

Daniel Palacios, National Oceanic and Atmospheric Administration (NOAA)

14.00-14.30: The impact of climate change on marine mammals II

Salvatore Cerchio, Wildlife Conservation Society (WCS)

Marine mammals are being particularly hard-hit by global warming and ocean acidification. What is the current status and outlook for the migratory species in the marine environment, especially at the poles? What measures beyond climate change mitigation are likely to be beneficial to reduce the vulnerability of migratory marine mammals?

14.30-15.00: The impact of climate change on ungulate migrations, with a focus on Central Asia
Navinder Singh, Swedish University of Agricultural Sciences
The migratory patterns of large ungulates such as Mongolian Gazelles, Bactrian Camels and Saiga Antelopes are closely related to vegetation and freshwater dynamics and therefore linked to climate change. Shifts in migration dynamics have led to increased vulnerability, for example due to a higher encounter rate of barriers to migration and competition with livestock. Which species are particularly affected and which measures should be taken by CMS Parties?

15.00-15.30: Coffee break

15.30-16.00: Which migratory species are most threatened by climate change?
Monika Böhm, Zoological Society of London (ZSL)
Presentation of a ZSL research project subcontracted by CMS to develop a preliminary analysis for identifying those species listed on CMS Appendix I which are most vulnerable to climate change. Linkages to the development of a "red flag" for the IUCN Red List indicating climate change threat level. Which factors determine how threatened a species is to climate change? What does this imply for applied conservation measures?

16.00-18.00: Development of recommendations for inclusion in CMS' policy based on Day I
Chair: Colin Galbraith
Based on the discussions today and the background documentation provided, this open session is aimed at brainstorming and collecting research priorities and policy recommendations for inclusion in CMS's climate change policy, specifically the climate change resolution.

Day II: RECOMMENDATIONS FOR ACTION

Moderator: Borja Heredia

09.00-09.30: Assessment of CMS climate change policy and legal aspects

Arie Trouwborst, Tilburg Law School

Legal analysis of CMS' current climate change mandate. What is missing and what should be taken into consideration when drafting the climate change recommendations for CMS COP10?

9.30-10.00: A national perspective on effectively addressing the threat that climate change poses for migratory species, with a focus on migratory birds

Grzegorz Rakowski, Institute of Environmental Protection, Poland

10.00-10.30: Wetlands, waterbirds and climate change.

Tour du Valat

How are wetlands and waterbirds being affected by climate change? Observations from Tour du Valat. Evaluation of adaptation options.

10.30-11.00: Coffee break

11.00-11.30: Recommendations submitted by CMS Scientific Council members

Presentation of specific input to the workshop from the Scientific Council working group on climate change and the CMS Scientific Council.

11.30-13.00: Collection of relevant recommendations resulting from Day II

Chair: Colin Galbraith

Based on the discussions this morning, this open session is aimed at brainstorming and collecting policy recommendations for inclusion in CMS's climate change policy, specifically the climate change resolution.

12.30-13.30: Lunch

13.30-15.00: Collate and review recommendations from Day I & II

Chair: Colin Galbraith

Collate and prioritise recommendations to adopt a final set of recommendations for inclusion in the COP10 climate change resolution.

15.00-15.30: Coffee break

15.30-18.00: Collate and review recommendations from Day I & II, continued

Chair: Colin Galbraith

Final discussion of the recommendations and adoption by the meeting.

- Closure of the meeting -

Day III: EXCURSION AND GUIDED TOUR OF THE TOUR DU VALAT ESTATE

Details to follow

BACKGROUND

Climate change is likely to become one of the primary drivers of biodiversity loss within the current century. Since the process of animal migration is closely connected to climatic factors, migratory species will be strongly affected. Currently, we are seeing widespread shifts in migration timing, direction and strength, as well as the first population declines as a result of climate change. The aim of the proposed workshop is to provide the almost 150 countries which have signed one or more instruments of the UNEP Convention on Migratory Species (CMS) with specific guidance on what action they should be taking to address the threat that climate change poses to migratory species. The workshop's outputs will feed directly into a resolution on climate change which will be adopted at the Tenth CMS Conference of the Parties (20-25 November 2011, Norway) and build up on the strong climate change mandate from COP8 and COP9.

CMS is an international treaty aimed at species management, and therefore in the context of climate change the treaty is a tool for regulating adaptation rather than mitigation. There are of course many interactions with mitigation measures, such as the impact of renewable energy structures on migratory species, but these will not be a priority subject for this adaptation-focussed workshop.

Specific questions which the workshop will address include: How are the different taxonomic groups listed on CMS' Appendices responding to climate change? How are the migratory species in regions which are particularly vulnerable to climate change affected (e.g. Arctic)? Which migratory species will be most strongly affected by migratory species? Out of those species which will be strongly affected, which ones can we actually assist through adaptation measures? What are those adaptation measures – how, when and by whom should they be taken? What are the best measures for action in the light of uncertainty? How should ecological networks be designed in this context? Should we use migratory species as indicators of the biological consequences of climate change, and if so, how? Should we focus our conservation efforts on the most threatened species or on those with the best capacity for adaptation? Is translocation something that should be internationally regulated (i.e. through CMS)? Where are the biggest research gaps (subject/taxonomic/regional)?

Relevant CMS decisions and related CMS literature

CMS decisions:

UNEP/CMS (1997). Recommendation 5.5 on climate change and its implications for the Bonn Convention
http://www.cms.int/bodies/COP/cop5/English/Rec5.5_E.pdf

UNEP/CMS (2005). Resolution 8.13 on climate change and migratory species
http://www.cms.int/bodies/COP/cop8/documents/proceedings/pdf/eng/CP8Res_8_13_ClimateChange&MigratorySpecies_E.pdf

UNEP/CMS (2008). Resolution 9.7 on climate change impacts on migratory species
http://www.cms.int/bodies/COP/cop9/Report%20COP9/Res&Recs/E/Res_9_07_Climate_Change_En.pdf

CMS conference and information documents:

UNEP/CMS (2005). Conference document 8.22 on climate change and migratory species (submitted by the UK)
http://www.cms.int/bodies/COP/cop8/documents/meeting_docs/en/Doc_22_Climate_Change_and_Migratory_Species.pdf

UNEP/CMS (2005). Information document 8.19 on climate change and migratory species (submitted by the UK)
http://www.cms.int/bodies/COP/cop8/documents/meeting_docs/en/Inf_19_Climate_Change_Migratory_Species.pdf

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http://www.cms.int/bodies/COP/cop9/documents/meeting_docs/English/Doc_24_Climate_Change_&_Migratory_Species_E.pdf

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