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Climate change and wetlands: implications for the Ramsar Convention on Wetlands

Information Paper prepared by the Scientific & Technical Review Panel

Introduction

1. This paper is intended to support considerations of the Draft Resolution on climate change and wetlands that has been prepared for discussion by Contracting Parties during the 11th meeting of the Conference of the Contracting Parties (COP11). It provides background information on the technical issues covered in COP11 DR14 and does not pre-empt any decisions taken by the COP on that Draft Resolution. The paper is divided into the following sections: collaboration with other organizations; information sources; vulnerability; adaptation; mitigation; and maintenance of the ecological character of wetlands.
2. The paper responds to the request in Ramsar Resolution X.24 on *Climate change and wetlands*¹ to investigate the potential contribution of wetland ecosystems to climate change mitigation and adaptation, in particular for reducing vulnerability and increasing resilience to climate change. It builds on the work undertaken by the Scientific and Technical Review Panel (STRP) through its Thematic Work Area on Climate Change which is described in the Report of the STRP Chair to COP11 (COP11 DOC. 6).
3. A key feature of the work undertaken by the STRP is the recognition that climate change represented a cross-cutting issue for other work areas by the STRP, for example, restoration and human health and wetlands, and it provides an opportunity to integrate information and share the expertise available to the STRP from external agencies and organizations. This continued a pattern established by the STRP through its involvement in global assessments, such as the Millennium Ecosystem Assessment, the Comprehensive Assessment of Water Management in Agriculture, and the World Water Development Reports, and its collaboration with the Convention on Biological Diversity (CBD).
4. The paper does not attempt to provide a description of the causes and projected consequences of climate change. Such information is available in the assessment reports

¹ Resolution X.24 *Climate change and wetlands*. www.ramsar.org/pdf/res/key_res_x_24_e.pdf.

provided by the Intergovernmental Panel for Climate Change (IPCC)² and the wider published literature. Rather, the emphasis is on how climate change will affect efforts by Contracting Parties and others to achieve the wise use of wetlands in the future.

5. The following two quotations from the synthesis provided as part of the IPCC's Fourth Assessment Report³ describe the backdrop for the continued interest of the Ramsar Convention in climate change with a particular focus on how changes in the climate will affect the wise use of wetlands.

Warming of the climate system is unequivocal, as is now evident from observations of increases in global average air and ocean temperatures, widespread melting of snow and ice and rising global average sea level.

Observational evidence from all continents and most oceans shows that many natural systems are being affected by regional climate changes, particularly temperature increases.

6. The urgency for considering the role of climate change in wetland management is illustrated by this quotation from the IPCC Technical Paper on Climate Change and Water:

Of all ecosystems, freshwater ecosystems will have the highest proportion of species threatened with extinction due to climate change.⁴

7. As freshwater wetlands are already under immense pressure from other drivers, the expectation that climate change will further impact adversely on these ecosystems is genuine cause for concern. In response to this situation, the STRP has sought to compile information and provide guidance to Contracting Parties on measures to assess the vulnerability of wetlands to climate change and adaptation measures within the context of wise use. This has been done in collaboration with other organizations and technical initiatives. It has also been done with full recognition that implementation of the commitment under the Convention to maintain the ecological character of wetlands may become somewhat more complex where ecological changes as a consequence of climate change intersect with those from other drivers of change, such as those caused by the diversion of water for agricultural and other purposes, or the alteration of river flows.

Collaboration with other organizations

8. During the 2009-2012 cycle, the STRP and its representatives have collaborated with a number of organizations and processes involved in working to address different aspects of climate change impacts, including on approaches to climate change mitigation and adaptation responses, in recognition that a) the Convention and its Panel cannot work alone in addressing climate change issues; and b) such collaborations provide the

² Intergovernmental Panel for Climate Change. <http://www.ipcc.ch/>

³ Climate Change 2007: Synthesis Report
www.ipcc.ch/publications_and_data/ar4/syr/en/spms1.html

⁴ www.ipcc.ch/pdf/technical-papers/ccw/chapter7.pdf

opportunity to ensure that Ramsar wise use issues and needs are incorporated and supported in such other climate change-related processes.

9. STRP technical advice has been made to the Danone / IUCN / Ramsar *Danone Fund for Nature* concerning carbon sequestration and storage capacities and issues in different wetland types, and specifically in relation to mangrove restoration for carbon offsets; to the IUCN-coordinated *Blue Carbon policy working group*; to the work being developed by the World Bank concerning “ecosystem-based adaptation to climate change” (EBA); to an ongoing joint STRP / Ramsar / CBD project that is reviewing the role of biodiversity, including wetlands, in the functioning of the global water cycle and the implications for delivery of ecosystem services in a changing climate; and to an FAO-led initiative on approaches to maintaining carbon sequestration processes in organic (peat) soil croplands.

Information sources

10. From the rapidly increasing amount of published information available on climate change, the IPCC provides, at regular intervals, a major information source through its comprehensive assessments of the scientific, technical and socio-economic information on human-induced climate change, including the potential impacts and options for mitigation and adaptation. It also provides special reports, technical papers and supporting material, generally in response to requests from the Conference of the Parties to the UNFCCC, or from other environmental conventions. Information on the IPCC and its procedures and reports is available at <http://www.ipcc.ch>.
11. The IPCC has completed Four Assessment Reports: in 1990 (AR1), 1995 (AR2), 2001 (AR3) and 2007 (AR4). The Fifth Assessment Report (AR5) is in preparation and is due for completion in 2013/14. The Assessment Reports build on each other by updating rather than repeating the information provided in the preceding report. The AR4 comprised four volumes, namely:
 - Working Group I Report “The Physical Science Basis”;
 - Working Group II Report “Impacts, Adaptation and Vulnerability”;
 - Working Group III Report “Mitigation of Climate Change”;
 - AR4 Synthesis Report.

Each of the Working Group report volumes contained a Summary for Policy Makers, a Technical Summary, and individual chapters. The Synthesis Report was written in a non-technical style and contains a Summary for Policymakers.

12. The IPCC Assessment Reports do not contain a specific chapter on wetlands, but wetlands feature prominently in many chapters, such as those on freshwater resources, ecosystem properties and goods and services, coastal systems, and the regional chapters. Further information on wetlands has been provided in two other IPCC technical papers, covering “Climate Change and Water” (2008) and “Climate Change and Biodiversity” (2002). The report of Working Group II of the AR4 provided a great deal of information on wetlands and concluded that the:

Impacts of climate change on aquatic ecosystems (not only temperatures, but also altered flow regimes, water levels, and ice cover) are not adequately understood.⁵

13. The inadequacy of the information on the impacts of climate change on wetlands has concerned the STRP, especially given the long-standing gaps in wetland inventory efforts globally, as reported formally to the Convention at COP7⁶ and as subsequently updated in the National Reports to the COPs⁷.
14. In 2002 the STRP compiled information on wetlands from the IPCC Third Assessment Report (AR3) and provided this as an Information Paper to COP8⁸. A further paper is presently being prepared by the STRP from information contained within the Fourth Assessment Report, and complemented with more recent information being published by many organizations, including Ramsar IOPs, such as the extensive information on peatlands being developed by Wetlands International and others, as well as that contained in a series of papers on wetlands and climate change in specific geographic regions being prepared by members of the Global Wetland Consortium⁹ for publication in the peer-reviewed journal *Aquatic Sciences*¹⁰.
15. The above sources will provide a wealth of up-to-date information on climate change and wetlands, mainly from the biophysical aspect of wetland vulnerability and adaptation and/or mitigation of climate change.
16. Further information on the impact of climate change on people associated with wetlands is also emerging, particularly in response to potential impacts on human health, for example from disease vectors (see the 2012 Ramsar Technical Report no. 6¹¹), and also on institutional responses, such as the increasing literature on integrated responses for managing wetlands, water and ecosystem services.
17. In addition to the information expected to be presented in the forthcoming AR5 from the IPCC, information on wetlands and climate change is also becoming available from, for example, analyses of agriculture, freshwater and coastal change. In this respect, there is increasing interest in considering wetlands as settings for human well-being where climate change and other impacts on wetlands interact, and potentially undermine, existing efforts to maintain the ecological character of wetlands, including the many ecosystem services

⁵ www.ipcc.ch/publications_and_data/ar4/wg2/en/ch3s3-8.html

⁶ www.ramsar.org/cda/en/ramsar-documents-cops-cop7-ramsar-cop7-doc-19-3/main/ramsar/1-31-58-83%5E18751_4000_0__

⁷ www.ramsar.org/cda/en/ramsar-documents-natl-rpts/main/ramsar/1-31-121_4000_0__

⁸ Climate Change and Wetlands: Impacts, Adaptation and Mitigation. Ramsar COP8 – DOC. 11 Information Paper. www.ramsar.org/pdf/cop8/cop8_doc_11_e.pdf

⁹ The direction and scope of the Global Wetland Consortium (<http://www.globalwetlands.org/>) is being discussed during the 9th INTECOL International Wetlands Conference, 3-8 June, Orlando, Florida, USA.

¹⁰ www.springerlink.com.ezproxy.csu.edu.au/content/101191/

¹¹ Horwitz, P., Finlayson, M. and Weinstein, P. 2012. *Healthy wetlands, healthy people: a review of wetlands and human health interactions*. Ramsar Technical Report no. 6. Secretariat of the Ramsar Convention on Wetlands, Gland, Switzerland, & The World Health Organization, Geneva, Switzerland. www.ramsar.org/pdf/lib/rtr6-health.pdf

that support livelihoods and human wellbeing¹². It is anticipated that such information will provide an increasingly valuable resource for determining adaptation responses to climate change impacts on wetlands, as well as supporting wider efforts to ensure integration among the many sectors involved in wetland management.

Vulnerability assessment

18. Assessing the vulnerability of wetlands to climate change has been addressed by the STRP during this triennium (see Ramsar Technical Report no. 5¹³ published jointly with the Secretariat of the Convention on Biological Diversity), building upon material provided by the IPCC and augmented by information from the wider literature, in particular that covering the concept of risk assessment which is encompassed within vulnerability assessment (and already addressed in Resolution VII.10¹⁴).
19. The information concerning vulnerability assessment summarised below is taken largely from Ramsar Technical Report no. 5. The concept of vulnerability assessment has also been incorporated in the Ramsar Convention's Integrated Framework for Wetland Inventory, Assessment and Monitoring, adopted by COP9 Resolution IX.1 Annex E¹⁵.
20. In the context of the Ramsar Convention, vulnerability assessment refers to the relationship between exposure to a particular risk event, the impact of that event on a wetland, and the ability of the wetland to cope with the impacts or the efforts needed to minimize the impacts. The concepts of coping capacity or resilience and sensitivity are included within vulnerability, and are especially important in the context of assessing changes in the ecological character of a wetland due to climate change.
21. Although it has been useful to develop methods that concentrate on the vulnerability of a wetland to climate change, such as those developed in the 1990s that identified the characteristics and present condition of the wetland as well as projected changes and management responses, vulnerability should also be considered in a broader context since climate change is often an added or cumulative pressure on many wetlands. Vulnerability assessments should therefore consider the ability of a wetland to cope with impacts from any and all externally-driven forces.
22. By bringing together information from various methods and approaches, a general framework for wetland vulnerability assessment has been developed, with the following elements:
 - i) establishing present status and recent trends: description of the wetland, the present and recent pressures, and the present condition. Due to limited data for many

¹² Refer to footnote 9.

¹³ Gitay, H., Finlayson, C.M. & Davidson, N.C. 2011. *A Framework for assessing the vulnerability of wetlands to climate change*. Ramsar Technical Report no. 5/CBD Technical Series no. 57. Ramsar Convention Secretariat, Gland, Switzerland & Secretariat of the Convention on Biological Diversity, Montreal, Canada. www.ramsar.org/pdf/lib/lib_rtr05.pdf

¹⁴ Resolution VII.10 *Wetland Risk Assessment*. www.ramsar.org/pdf/res/key_res_vii.10e.pdf

¹⁵ Resolution IX.1 Annex E. *An Integrated Framework for wetland inventory, assessment and monitoring (IF-WLAM)*; Ramsar Wise Use Handbook 13, 4th edition 2010. www.ramsar.org/pdf/lib/hbk4-12.pdf

wetlands, local knowledge is used to complement the information collected by contemporary scientific means;

- ii) determining the wetland's sensitivity and adaptive capacity to multiple pressures: description of the pressures on the wetland and the development of plausible future changes in order to assess the sensitivity and adaptive capacity of the wetland;
 - iii) developing responses: determining the likely impacts of these changes on the wetland and the desired outcomes for it, as well as the responses that can be developed and implemented given its sensitivity and resilience; and
 - iv) monitoring and adaptive management: determining the necessary steps to ensure the path to the desired outcomes.
23. The Ramsar vulnerability assessment framework has much in common with the risk assessment and risk management methods that have been developed in the last decade. Such assessments are most effectively conducted within an adaptive management planning process that outlines the overall management goals or targets for the wetland and provides a focus for determining responses, including decisions about monitoring and the prioritisation of any remedial actions.
24. There still remain many challenges for wetland vulnerability assessment that will have to be addressed in order to provide the level of information required for management purposes. These include:
- i) the lack of spatial and temporal data at appropriate scales to determine the status and trends in the condition of a wetland, its natural dynamics, its sensitivity to past and present pressures, and potential thresholds, inertia or lag effects;
 - ii) an understanding of the complexity of the multiple, interactive pressures that affect wetlands (e.g., land use and land cover change, pollution, climate change, etc.);
 - iii) the need for developing appropriate metrics that can be used to measure the vulnerability of a wetland to multiple pressures; and
 - iv) the limited data and understanding of the sensitivity and adaptive capacity of wetlands, including the capacity of local communities to respond and adapt to changes in the ecological character of a wetland.
25. The Ramsar vulnerability assessment framework has been applied in several instances, for example for high altitude wetlands in Ladakh, India, and for coastal wetlands in Sydney, Australia, but wider examples and case studies are needed to illustrate how the components of vulnerability can be addressed in different wetland types and with different management regimes. In particular, case studies can be used to provide specific information for different wetland types and take into account the variable nature of vulnerability and coping capacity.
26. The development of such case studies is being encouraged by the STRP and opportunities are being sought to link these with analyses of ecosystem-based adaptation options for wetland managers, including studies that consider the coping capacity of the local communities and their responsiveness to changes in wetland ecosystem services that provide benefits for local people.

Adaptation

27. The AR3¹⁶ of the IPCC describes the concept of adaptation to climate change as follows:

Adaptation to climate change takes place through adjustments to reduce vulnerability or enhance resilience in response to observed or expected changes in climate and associated extreme weather events. Adaptation occurs in physical, ecological and human systems. It involves changes in social and environmental processes, perceptions of climate risk, practices and functions to reduce potential damages or to realise new opportunities. Adaptations include anticipatory and reactive actions, private and public initiatives, and can relate to projected changes in temperature and current climate variations and extremes that may be altered with climate change. In practice, adaptations tend to be on-going processes, reflecting many factors or stresses, rather than discrete measures to address climate change specifically.

28. The AR3 also suggested that climate change adaptation processes and actions face significant limitations, especially in vulnerable nations and communities.
29. Adaptation measures have the potential to alleviate the adverse impacts of climate change on wetlands as well as to capitalise on new opportunities. Adaptation to climate variability and possibly also to climate change, is occurring in many countries in both the developed and developing worlds and is seldom undertaken in isolation of wider management activities or processes.
30. The IPCC considers adaptation as actual adjustments or changes in decisions that ultimately enhance resilience or reduce vulnerability to observed or expected changes in climate. For wetlands this could include further investment in coastal infrastructure to reduce vulnerability to storm surges and sea-level rise, or changes in policies to support increased resilience to climate variability, whether differentiated by spatial scale, the sectors that affect wetlands, or the type of action to avoid or repair adverse change in wetlands, or by a combination of activities. Further, adaptation can include responses to current variability, observed medium and long-term trends in climate, and anticipatory planning in response to scenarios of long-term climate change.
31. There is increasing evidence from ecological studies that the resilience to climate change depends on the rate and magnitude of the change, and that there may be thresholds beyond which some systems may not be able to adapt without altering their ecological state. Changes of this nature may transform the physical environment of a wetland, such as permanent lakes or coral reefs, and limit the possibilities for adaptation.
32. Other phenomena that may place limits on adaptation include persistent below-average rainfall and recurrent droughts, as well as the loss of Arctic sea ice. The loss of keystone species or changes in ecological processes as a consequence may eventually influence ecosystem services upon which people rely, such as fisheries and wetland-related agriculture.

¹⁶ www.ipcc.ch/publications_and_data/ar4/wg2/en/ch17s17-1.html

33. Assessments of adaptation costs and benefits are required, including evaluations of the impacts, or likely impacts, of sea-level rise or storm surges on coastal wetlands, including mangroves and lagoons that support the livelihoods of many people. It is also necessary to consider, in addition to economic costs and technology, the influence of social factors and institutional arrangements on the ability of individuals and communities to respond to changes in the climate and how these impact on wetlands. Given the intertwined and complex nature of some institutional arrangements, there has been an increasing interest in considering the advantages of Ecosystem-Based Adaptation to climate change (EBA), including by the IPCC in the upcoming AR5. See also the discussion of approaches to marine and coastal EBA provided in Hale *et al* (2009)¹⁷.
34. Ecosystem-Based Adaptation is generally considered as an integrated approach to adaptation that assists in building resilience to climate change impacts whilst reducing vulnerability, and is applicable in both developed and developing countries. It is seen as embracing an ecosystems-based approach to adaptation and specifically draws on the principles and guidance provided by the “Ecosystem Approach”¹⁸ of the Convention on Biological Diversity and the “Wise Use”¹⁹ approach of the Ramsar Convention. In the context of wetlands it has a particular focus on supporting communities in coping with the impacts of climate change on wetlands by taking into account the interactions between people and wetlands to ensure that they are resilient and healthy in the long term, also taking into account possible future changes in climate conditions as well.
35. The STRP and the Secretariat have been in discussion with other organizations interested in developing guidance for Ecosystem-Based Adaptation, including the World Bank and international NGOs, to explore synergies with the Ramsar concept of wise use and the Ramsar Wise Use Handbooks²⁰ in particular, to determine how the existing wise use guidance can inform climate change adaptation, or be adapted to contend with the long-term influence of climate change. Case studies that illustrate the usefulness of various adaptation measures, such as the application of environmental flows or the construction of environmental works (e.g., fish passages, water diversion structures, channels or canals) could be particularly instructive and provide guidance to Contracting Parties about the relative merits or shortfalls of such measures.

Mitigation

36. Mitigation in the context of climate change describes, in a general sense, any action that prevents, reduces or slows climate change and can be achieved either by reducing greenhouse gas sources and emissions or by enhancing greenhouse gas sinks.

¹⁷ Hale, L.Z., Meliane, I., Davidson, S., Sandwith, T., Beck, M., Hoekstra, J., Spalding, M., Marawski, S., Cyr, N., Osgood, K., Hatzios, M., van Eijk, P., Davidson, N., Eichbaum, W., Creus, C., Obura, D., Tamelander, J., Herr, D., McClennen, C. & Marshall, P. 2009. Ecosystem-based Adaptation in Marine and Coastal Ecosystems. *Renewable Resources Journal* 25(4): 21-28.

¹⁸ www.cbd.int/ecosystem/

¹⁹ Ramsar Wise Use Handbook 1 (4th edition 2010): www.ramsar.org/pdf/lib/hbk4-01.pdf

²⁰ Ramsar Wise Use Handbooks (4th edition 2010): www.ramsar.org/cda/en/ramsar-pubs-handbooks-handbooks4-e/main/ramsar/1-30-33%5E21323_4000_0__

Carbon storage in, and emissions from, wetlands

37. The importance of carbon storage and emissions from wetlands, in particular from tropical peatlands and coastal salt marshes, mangroves and seagrass beds, is increasingly being recognized. Tropical forested peatlands as carbon sinks and sources have received a great deal of attention, with more recent and thorough investigations reducing some of the uncertainties that accompanied many previous assessments²¹. Their conversion to oil palm plantations has been investigated over the last 1-2 decades, with an increasing emphasis on determining the extent of carbon emission and the impact on local livelihoods. Different and independent sources, such as literature reviews, measurement of carbon dioxide flux, and changes in soil bulk density are showing similar results and confirming that subsidence and carbon loss is inevitable under current land use practices in oil palm plantations and could eventually end in flooding and loss of agricultural production as well as contributing to carbon emissions.
38. Many wetlands contain large stores of carbon laid down over centuries. If these should be degraded, large amounts of carbon in the form of Greenhouse Gases (GHGs) can be released to the atmosphere and contribute to anthropogenic climate change. This is well known for peatlands, both forested and non-forested. The Food and Agriculture Organisation of the United Nations and Wetlands International²² have produced guidance for the management and finance options to achieve reductions in emissions and enhance the maintenance of other ecosystem services from peatlands. The guidance provides a decision support tree as a guide to opportunities for both cultivated and uncultivated peatlands and outlines methods and data available for quantifying emissions from peatlands and other organic soils.
39. Recently there has been increased attention to the storage of carbon in coastal ecosystems, notably mangroves, tidal saltmarshes and seagrass beds, which can store large quantities of what is increasingly becoming called ‘blue carbon’^{23,24}. There is growing evidence that the management of “blue carbon” wetlands has the potential to transform global carbon management, contribute to avoiding further loss and degradation of these ecosystems, and provide further incentives for their restoration and sustainable use. Efforts are underway to develop measures, including policies, for effective carbon management and incentives for the conservation of blue carbon²⁵. It is understood that the maintenance of the carbon

²¹ Page, S.E., Rieley, J.O., and Banks, C.J. 2011. Global and regional importance of the tropical peatland carbon pool. *Global Change Biology* 17: 798–818.

²² Joosten, H., Tapio-Biström, M-L., & Tol, S. (eds.) 2012. Peatlands - guidance for climate change mitigation by conservation, rehabilitation and sustainable use. *Mitigation of Climate Change in Agriculture Series* 5. FAO, Rome.

²³ Nellemann, C., Corcoran, E., Duarte, C. M., Valdés, L., De Young, C., Fonseca, L., Grimsditch, G. (Eds). 2009. Blue Carbon. A Rapid Response Assessment. United Nations Environment Programme, GRID-Arendal. www.grida.no/publications/rr/blue-carbon/

²⁴ Danone Fund for Nature. 2010. *Achieving Carbon Offsets through Mangroves and Other Wetlands*. November 2009 Expert Workshop Meeting Report, ed. Nick Davidson. Danone Group/IUCN/Ramsar Convention Secretariat, Gland, Switzerland. 87pp. www.ramsar.org/pdf/DFN_report_Final.pdf

²⁵ Herr, D. Pidgeon, E. and Laffoley, D. (eds.) (2011). Blue Carbon Policy Framework: Based on the first workshop of the International Blue Carbon Policy Working Group. Gland, Switzerland: IUCN and Arlington, USA.

storage function of these wetlands has the potential to support the maintenance of the ecological character, including a range of ecosystem services, of these coastal wetlands, many of which have been degraded or lost over recent decades.

40. The IPCC is also paying increasing attention to wetlands in relation to greenhouse gases. In response to an invitation by the UNFCCC, the IPCC Task Force on National Greenhouse Gas Inventories is preparing supplementary guidelines for including wetlands in National Greenhouse Gas Inventories²⁶ (currently under expert review to June 2012). This supplementary guidance addresses, as far as possible, the gaps identified in the 2006 IPCC Guidelines. It focuses on those human activities and management that give rise to anthropogenic emissions or removals by wetlands and includes cross-cutting guidance on organic soils, the rewetting and restoration of peatlands, other freshwater wetlands, coastal wetlands, and constructed wetlands used for wastewater treatment.

REDD+ and wetlands

41. There has been growing interest in the interactions between biodiversity, including wetlands, and climate change mitigation activities in the wake of discussions through the UNFCCC to develop schemes with the potential for Reducing Emissions from Deforestation and Forest Degradation, often referred to as REDD+. Forested wetlands, such as mangroves and tropical peat-swamp forests, can be covered by REDD+ activities. Non-forested wetlands, such as herbaceous peatlands, coastal salt marshes and seagrass beds, which store large amounts of carbon, are not covered by REDD+ but could potentially be the subject of further global mitigation measures for non-forested ecosystems.
42. The UNFCCC COP16 in 2010 made a series of recommendations about REDD+ including encouraging developing country Parties to contribute to greenhouse gas mitigation actions in the forest sector by undertaking REDD+ activities. This included a decision that the implementation of REDD+ would take place in three phases:
- i) “the development of national strategies or action plans, policies and measures, and capacity-building”;
 - ii) “the implementation of national policies and measures and national strategies or action plans that could involve further capacity-building, technology development and transfer and results-based demonstration activities”;
 - iii) “results-based actions that should be fully measured, reported and verified.”
43. The UNFCCC further requested that developing countries aiming to undertake REDD+ activities, should develop:
- i) a national REDD+ strategy or action plan;
 - ii) a national forest reference emission level and/or forest reference level;
 - iii) a robust and transparent national forest monitoring system; and
 - iv) a system for providing information on how the safeguards were being addressed and respected throughout the implementation of REDD+ activities.

²⁶ 2013 *Supplement to the IPCC Guidelines on National Greenhouse Gas Inventories: Wetlands*. See: www.ipcc-nggip.iges.or.jp/home/wetlands.html

44. Whilst these discussions are ongoing within the UNFCCC, the concepts and potential benefits and risks for biodiversity have attracted interest from other organizations. This has seen the World Bank establish the Forest Carbon Partnership Facility²⁷ as well as the Forest Investment Programme²⁸, which provide support to investments needed for the delivery of benefits from REDD+. The United Nations has established the United Nations REDD Programme²⁹ to support countries in preparing for REDD+.
45. The Convention on Biological Diversity has recognized that REDD+ could provide considerable benefits for biodiversity if such schemes were well designed and did not run counter to global biodiversity objectives³⁰, including those under the Strategic Plan for Biodiversity 2011-2020³¹. It has recognized that synergies exist between biodiversity and REDD+ and that the involvement of indigenous peoples and local communities will be essential for the success of REDD+. In support of this position it is seeking information on the application of relevant safeguards for biodiversity, including the identification of indicators to assess the contribution of REDD+ to achieving the objectives of the Convention, and to assess potential approaches to monitoring impacts on biodiversity from REDD+ and other ecosystem-based activities for climate change mitigation.
46. CBD COP10 in 2010 requested the Secretariat to prepare advice on these matters for consideration by CBD SBSTTA, the Convention's subsidiary scientific body. This was duly considered by CBD SBSTTA16 in May 2012 as UNEP/CBD/SBSTTA/16/8 "Advice on the Application of Relevant REDD+ Safeguards for Biodiversity, and on Possible Indicators and Potential Mechanisms to Assess Impacts of REDD+ Measures on Biodiversity"³². Following recommendations by SBSTTA16, a revised version of UNEP/CBD/SBSTTA/16/8 will be provided to Parties for their consideration at CBD COP11 in October 2012. The Ramsar Contracting Parties may wish to consider requesting the STRP, once this advice has been considered by CBD COP11, to review it and advise on its relevance for application to forested wetlands in relation to the Ramsar Convention. This approach would be consistent with the provision in the CBD/Ramsar Joint Work Plan that advice on cross-cutting issues should be harmonized, and it follows the approach taken by Ramsar for the CBD's guidances on Environmental Impact Assessment (EIA) and Strategic Environmental Assessment (SEA), which were adopted with interpretation for the Ramsar context in Ramsar Resolution X.17 (2010).
47. The Convention on Migratory Species has also recently paid significant attention to issues of REDD+ relevant to migratory species. At CMS COP10 in October 2011, Parties adopted Resolution 10.19 on "Migratory Species conservation in the light of climate change" which *inter alia* "encourages Parties and relevant stakeholders to make use of available funding mechanisms, such as REDD+, to support the maintenance of ecosystem

²⁷ www.forestcarbonpartnership.org/

²⁸ See www.climateinvestmentfunds.org/cif/

²⁹ www.un-redd.org

³⁰ Secretariat of the Convention on Biological Diversity 2011. *REDD-plus and biodiversity*. CBD Technical Series no. 59. Secretariat of the Convention on Biological Diversity, Montreal, Canada. www.cbd.int/doc/publications/cbd-ts-59-en.pdf

³¹ Strategic Plan for Biodiversity 2011-2020, including Aichi Biodiversity Targets. www.cbd.int/sp/

³² www.cbd.int/doc/?meeting=sbstta-16

services, with the close involvement of local communities, in order to improve the conservation status of migratory species”.

48. It has been pointed out that REDD+ also has the potential to provide participating developing nations with funding for forest restoration activities that contribute to climate change mitigation, sustainable management, and carbon stock enhancement³³. While the REDD+ mechanism is not yet fully operational, it has conceptually expanded beyond activities that affect carbon budgets also to include those that enhance ecosystem services and deliver other co-benefits to biodiversity and communities. For this to be successful, practical tools and guidance are required for implementing restoration that can sequester carbon and improve the integrity and resilience of forest ecosystems, and mechanisms are needed to ensure that funding by international donors reaches the communities and individual landholders.
49. The development of REDD+ as a mechanism for reducing carbon emissions from forested ecosystems has not been without criticism. The concept is not universally accepted nor yet formally approved by the UNFCCC. There is increasing recognition that the further development of REDD+ will benefit from interdisciplinary research, especially in relation to the science, such as that needed to establish effective carbon measuring and accounting tools, and to the governance associated with how benefits should accrue for local communities and support biodiversity conservation. The Ramsar Convention’s wise use guidance with its emphasis on management planning, community involvement, and integration of technical measures could be used to support these efforts.

Offsetting carbon emissions through wetland restoration and management

50. There is increasing interest worldwide in establishing mechanisms for market-based approaches to offset carbon emissions through ecosystem restoration. There are two main approaches to this: the UNFCCC’s Clean Development Mechanism (CDM) and the Voluntary Carbon Standards (VCS). In 2011, carbon offsetting through voluntary markets transacted more than USD 576 million of offsets, of which 23% concerned afforestation / reforestation, avoided forest conversion, and forest management³⁴.
51. Through work undertaken by the Danone/IUCN/Ramsar “Danone Fund for Nature” (DFN), a first methodology was developed and approved by the CDM in June 2011 for “Afforestation and reforestation of degraded mangrove habitats”³⁵.
52. Under the Voluntary Carbon Standards approach, “Peatland Rewetting and Conservation (PRC)” rules have been established, along with a 2010 “Methodology for Conservation Projects that Avoid Planned Land Use Conversion in Peat Swamp Forests”³⁶. New draft requirements for crediting Wetland Restoration and Conservation (WRC) activities are

³³ Alexander, S., Nelson, C.R., Aronson, J., Lamb, D., Cliquet, A., Erwin, K.L., Finlayson, C.M., de Groot, R.S., Harris, J.A., Higgs, E.S., Hobbs, R.J., Lewis, R.R. III, Martinez, D., & Murcia, C. 2011. Opportunities and challenges for ecological restoration within REDD+. *Restoration Ecology* 19: 683-689.

³⁴ *Developing Dimension: State of Voluntary Carbon Markets Report 2012*. www.forest-trends.org/publication_details.php?publicationID=3164

³⁵ <http://cdm.unfccc.int/methodologies/DB/CKSXP498IACIQHXZPEVRJXQKZ3G5WQ>

³⁶ <http://v-c-s.org/methodologies/VM0004>

now being developed and are currently under expert review, with final requirements expected to be published in autumn 2012. The WRC requirements will create a broad new VCS project category for crediting climate benefits from a range of wetland areas, including mangroves, freshwater tidal coastal wetlands, salt marshes, sea grasses, floodplains, peatlands and potentially other areas. The existing Peatland Rewetting and Conservation (PRC) requirements will be merged into the new WRC category. The requirements are being developed by the VCS Wetlands Technical Working Group with support from the “Restore America’s Estuaries” initiative.

Maintenance of the ecological character of wetlands

53. Under Article 3.2 of the Ramsar Convention, “Each Contracting Party shall arrange to be informed at the earliest possible time 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. Information on such changes shall be passed without delay to the organization or government responsible for the continuing bureau duties specified in Article 8 [i.e., the Ramsar Secretariat]”.
54. Contracting Parties have adopted definitions of ecological character and change in ecological character (Resolution IX.1 Annex A, 2005), as well as guidance on describing ecological character (Resolution X.15, 2008) and on detecting, reporting and responding to change (Resolution X.16, 2008). Further elaboration of these issues is provided in COP10 DOC. 27 “Background and rationale to the Framework for processes of detecting, reporting and responding to change in wetland ecological character”.
55. COP11 DOC.24³⁷ discusses the extent of change in ecological character that should be reported in response to Article 3.2 in relation to approaches to establishing “limits of acceptable change in ecological character”. In particular, when is a change too trivial to require reporting, meaning in effect that it should not be regarded as a change within the terms of the Article?
56. The question then is how to define generally, or decide in an individual case, what is the cut-off threshold between a) trivial changes which can be ignored and b) other changes which may be indicating something major that requires a response. The second part requires the definition of the pre-existing or baseline ecological character state against which the occurrence of a change is to be discerned. The categories of baseline information, and some elements of the precision with which it should be described, are covered in the Convention’s guidance on describing wetland ecological character (Resolution X.15) and in the Ramsar Information Sheet (see Ramsar Wise Use Handbook 17, 4th edition 2010) and the Ramsar Information Sheet – 2012 revision and the accompanying 2012 revision to the *Strategic Framework and guidelines for the future development of the List of Wetlands of International Importance of the Convention on Wetlands (Ramsar, Iran, 1971)* to be considered by COP11 (COP11 DR8 Annexes 1 and 2).
57. There is no specific guidance to date, however, on how to distinguish between a) a Ramsar Site’s natural range of variation and b) a perturbation from human causes which becomes

³⁷ www.ramsar.org/pdf/cop11/doc/cop11-doc24-e-limits.pdf

superimposed on it and signals an issue of concern, such as from anthropogenic climate change.

58. With the wide recognition that climate change will impact on all wetlands in many ways, there is an increasing need to develop guidance on how to respond to change in the ecological character of wetlands, particularly in relation to the reporting requirements of Article 3.2 of the Convention. The Standing Committee of the Convention has previously considered this and noted that not all impacts from climate change will be negative, as is also noted by the STRP's information paper on climate change to COP8³⁸. Changes due to climate change may also affect the capability of Contracting Parties to establish an effective reference point for describing the ecological character of a wetland, or to ascertain when adverse change has occurred, or indeed, to restore the site, especially under circumstances where novel or emerging ecosystems are developing as a consequence of land use change, the spread of invasive species, and a changing climate.
59. Such implications of climate change for the reporting mechanisms of the Convention have not yet been elaborated, and further attention to this issue is needed. As an interim measure the STRP recommended during its mid-term workshop in 2011 that the impacts of climate change do not need to be reported under the existing arrangements for Article 3.2 reporting. It is suggested that consideration of these implications should be combined with those associated with the wider challenge of distinguishing unwarranted and unwanted change from inevitable and "natural" change, as is outlined in COP11 DOC.24 on the limits of acceptable change. That paper also contains a reminder that since Contracting Parties are committed to implementing the requirements of the Convention as they stand, they are obliged to guard against unwanted deterioration of wetland resources, including that which occurs as a consequence of climate change.